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The
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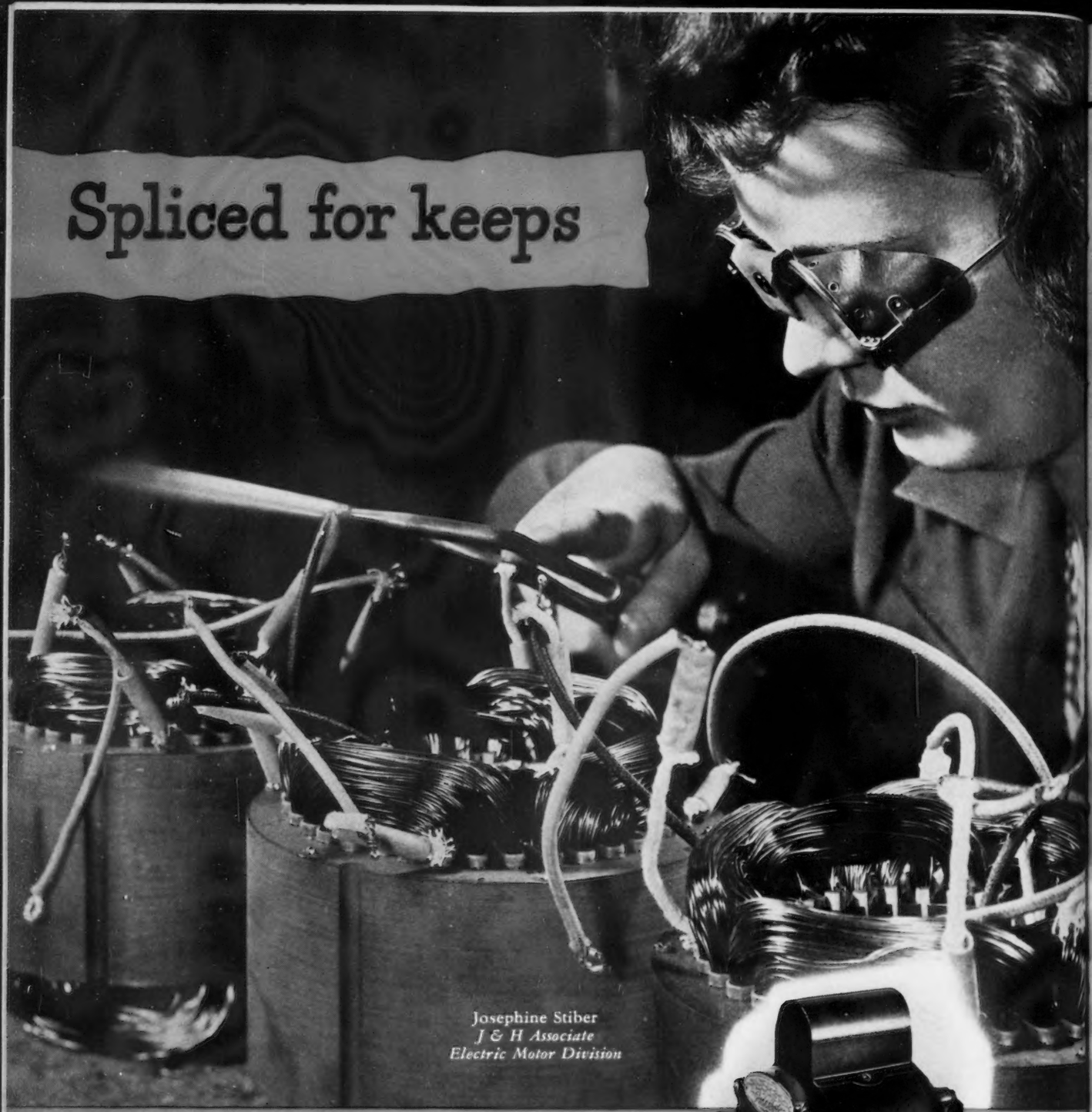

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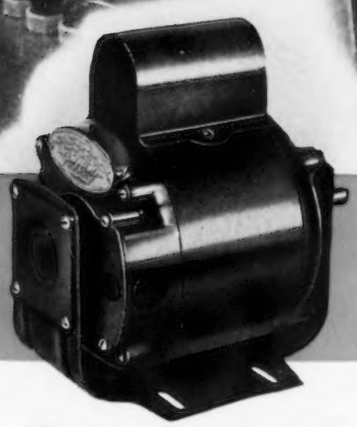

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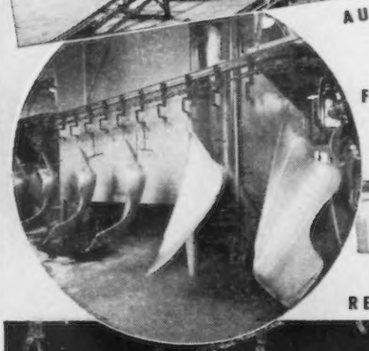

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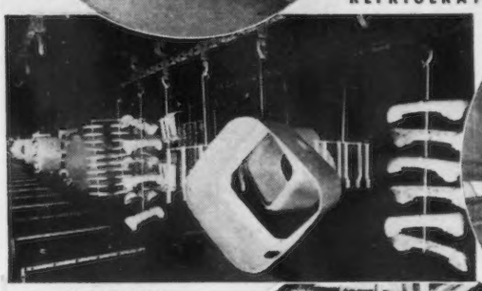

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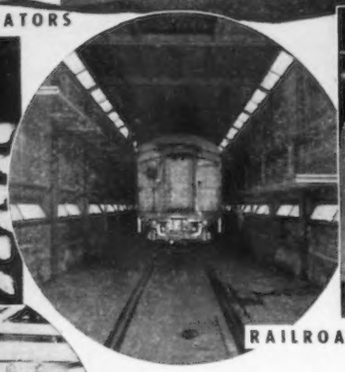

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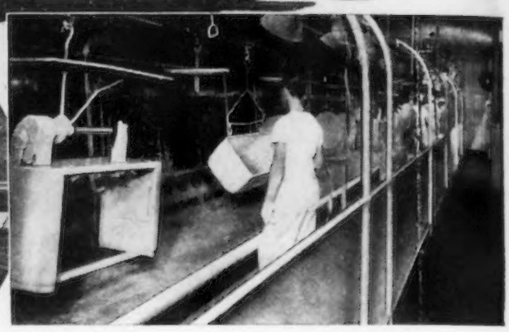

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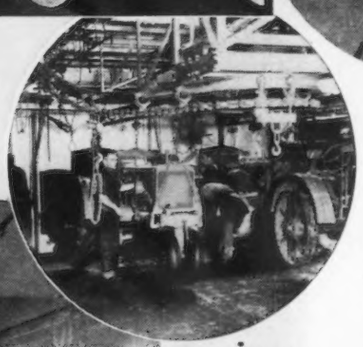

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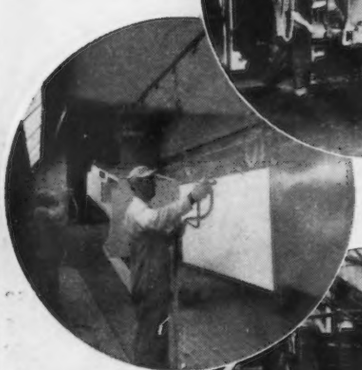

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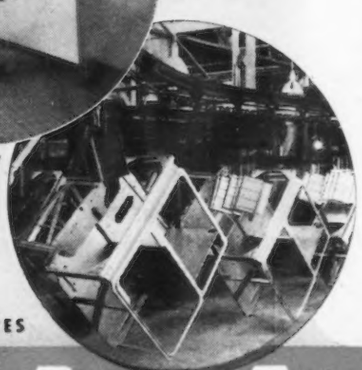

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The Best Laid Schemes

FOR several hundred years the United States' role in world trade was a simple one, easily understood by the least citizen. This country was a debtor nation—it bought more than it sold. To balance the books it became necessary to out-smart and out-sell the British, the Germans and the Japanese in South America, in Sweden, in Turkey, or wherever a customer could be found.

But in less than one generation a great and permanent change has taken place in world trade. The country is no longer (and likely never will be again) a debtor nation—the whole world is in debt to the United States. The whole world must ship this country more products, or more gold, if the books are ever to achieve some sort of balance. The problem is not one of selling but one of buying—or otherwise American exports are just so much goods given away.

Even the State Department economists, until quite recently, have failed to understand this permanent change in the economic status of the world. When the terms of the first British loan were laid down, the economists were concerned primarily with fracturing the delicate and finely-balanced trade relationships of the world in order to grease the skids for more American exports. The British Empire was to be pried open by establishing the principles of convertibility and non-discrimination.

As of July 15 of this year, Britain was obligated to convert any sterling balance in our country into dollars. This lasted about one week, and Britain ran out of dollars. Such was the fate of convertibility. As for the doctrine of non-discrimination, it specified that England and its dominions could not expand their intramural trade faster than they could expand their trade with the United States. Since these countries have no dollars and must reduce their trade with the United States, in theory, they must also reduce their trade with each other.

Thus the practical effect of two well-intentioned schemes has been just the opposite to that expected. International trade is slowing down and, at the moment, there is no firm international medium of exchange. There are no dollars, and British sterling has become scarce, soft and viewed with no great confidence in the markets of the world since the July 15 convertibility debacle.

Only more careful maneuvering can correct past mistakes and inject new life into a complex international machine which is now close to the stalling point. That is one purpose of the Marshall Plan.

Many countries of the world are absolutely dependent on a peculiar triangular existence with Britain and the United States at two points of the triangle. Canada, Ireland and Australia (to name a few) necessarily send most of their exports to Britain, which heretofore has paid them dollars to purchase goods from the United States. Unless Britain is loaned dollars until they can earn them through exports to the United States, economic repercussions must follow in all the countries with British trade ties.

All over the world there exists this complex overlay of triangular patterns of trade. The lack of dollars has fractured many a marital triangle. The same lack of dollars may soon fracture many a trade triangle, and painfully disturb the internal economies of countries thousands of miles from the storm center of Western Europe.

T. W. Lippert

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► The Turkish government has decided to enlarge the Karabuk iron and steel works in Central Anatolia. The plan will take at least four years to complete. New equipment will cost about $36 million--$20 million to be spent outside Turkey.

► The use of austenitic cast iron cylinder liners for truck engines is under serious consideration by several truck manufacturers who expect to be able to extend engine life by this development.

► The oft-probed War Assets Administration is steeling itself for another investigation--administrative practices will be the target this time.

At least two Congressional committees (and The Iron Age) have been increasingly annoyed by inability to get dependable information on inventories of various goods--such as surplus steel. Both the committees have been quietly accumulating ammunition for such an investigation.

► One fact often overlooked by proponents of mechanized coal mining is that while the quantity of material brought above ground is much greater than hand mining can produce, the refuse that must be discarded is appreciably larger.

At one highly mechanized mine, refuse has soared from nearly zero under hand operation to approximately 38 pct with mechanical mining. Handling and disposal of this refuse is a big problem.

► Britain's stocks of coal for the winter are rising more rapidly than was expected. Total distributed stocks on Oct. 11 were 15.2 million tons, about 0.2 million tons above the Nov. 31 goal. This makes the British fuel situation only tragic, where it was before considered hopeless.

► Neoprene auto tires produced by Dupont are reported to outwear ordinary rubber 100 pct and are expected to give a minimum of 50,000 miles of road service. Tests recently conducted indicated little wear on these tires at 40,000 miles.

► Automatic typewriters recently perfected will enable one stenographer to type as many as 600 individual letters in an 8 hr day.

► An iron and steelmaking project for Rhodesia, connected with a large hydroelectric power development is going forward. The Koriba gorge plan on the Zambesi has been approved by the governments of the Rhodesias, and the John Brown and Thomas Firth companies in Sheffield, England.

The governments are to put up $36 millions and the steel interests $20 millions. The power plant is to generate 750,000 k.w., and by using the cheap power, advance estimates call for steel production at 25 pct below present costs.

► Reports indicate that experimental work is being carried on for the use of copper flashed cold rolled steel sheets for gasoline tanks, in place of ternes.

► The Paris Marshall Plan conference report on steel indicates that French steel consumers will get 30 pct less steel than their "minimum" requirements this year, Netherlands users about the same, and the Italian shortfall is said to be about 40 pct.

► Some steel customers who are fortunate enough to have a fair supply of steel even though it is out of bounds are trying to decide whether to unload the material before the year-end inventory period. They will probably hold on to it--remembering that some plants got rid of their surplus stock before the June 3 inventory and now wish they had it back.

► Current experiments with radar on river boats serving the Pittsburgh area may save steel companies a lot of the money they are losing due to difficulty in navigating the narrow rivers and their bridges during foggy seasons.

► Steel companies are absorbing at least $2 million monthly in freight charges. This is the freight the customer doesn't pay because the steel producer pays the additional transportation charges to meet competition in certain markets. Detroit is one of the big absorption areas.

Graphical Correlation—

By CHARLES R. TAYLOR
Supervising Metallurgist, Research Laboratories,
American Rolling Mill Co.,
Middletown, Ohio

FROM time to time in scientific or human progress, a new tool or a new technique is discovered that shows so much promise and develops so rapidly in its scope of application that it stands out from associated methods like a beacon of hope. To the amateur who has labored through the maze of statistical methods in scores of text books, and who has gazed in horror at vast accumulations of numbers which must be unraveled, the method of multiple graphical correlation is such a beacon.

As familiarity with the method and facility in its handling is gained, it soon becomes almost second nature to apply it to any problem involving more than two variables, no matter how complex or how simple. The clarity of analysis and the understanding of the particular problem in question, as the analysis progresses, is in marked contrast with the usual mathematical methods whose cumbersome detail and sensitivity to minor arithmetical errors make it almost prohibitively complex in application. Its complete freedom from any restraining type of curve, such as the mathematical methods labor under, is another distinct advantage.

Book after book on statistics insists that natural processes proceed in smooth curves without discontinuities. Any metallurgist who has crossed a phase boundary will scoff at this statement, and one finds many discontinuities in man-made processes. One reason why they are so rarely uncovered is that the methods used to study them automatically conceal them.

Often the interrelationships which develop between the independent variables are as interesting and as thought provoking as the main subject of the study.

Before undertaking a detailed explanation of the method, it seems advisable to define a few terms and to waggle a few precautionary fingers in the general direction of anyone undertaking a statistical study. The most important variable being studied, and this is usually the so-called

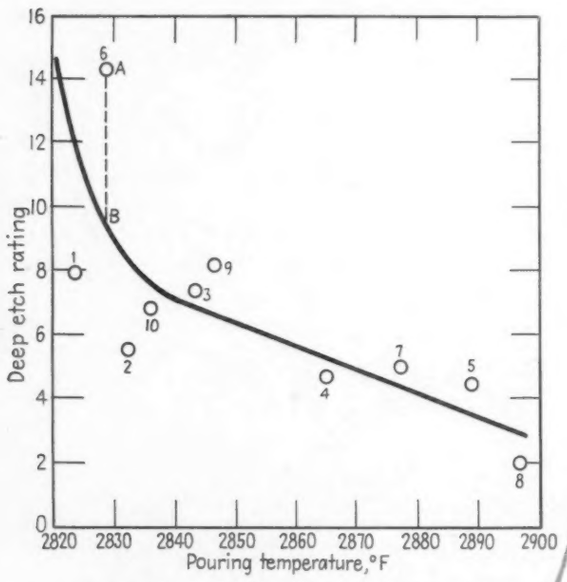
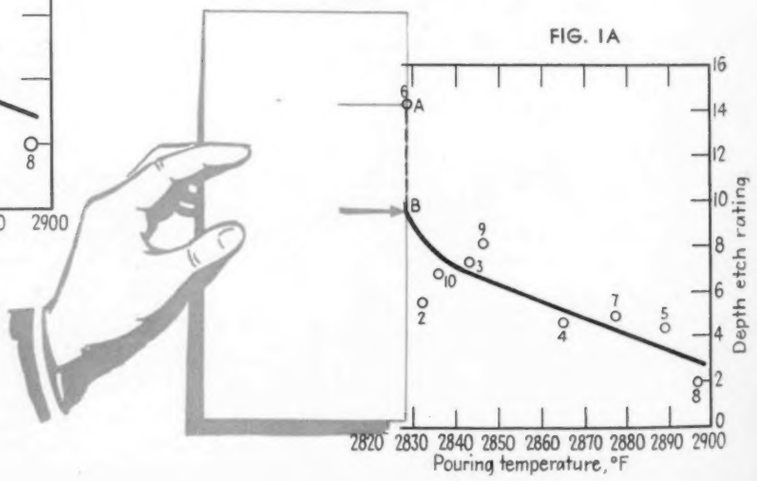


FIG. 1—Direct plot of effect of pouring temperature in deep etch.

FIG. 1A—Place narrow strip of paper alongside the curve with arrow mark set at the intersection of the curve and the vertical extension from each of the ten points to the curve. In case of point 6 (used as example) location B represents intersection. Mark off vertical deviation from point 6 to intersection—from A to B—as shown on strip. Then move paper strip horizontally across abscissa and indicate on strip the

FIG. 1A



Its Application to Steel Mill Problems

quality variable, is called the *dependent* variable, simply because its numerical value is dependent on all the others.

Examples of this might be tons per hour on an openhearth or electric furnace, the deep etch quality of steel, tensile strength, or the percent rejections for seams.

Since this is the dependent variable, then the others must be the *independent* ones. These might be such variables as percent hot metal as it effects tons per hour, or final silicon content as it effects deep etch quality. These independent variables are the ones measured and recorded. The validity and accuracy of the final answer is no better than the validity and accuracy of these primary observations. Too much emphasis cannot be put on obtaining accurate information on each independent variable. Too often data are used in spite of doubt as to its validity, with discouraging results.

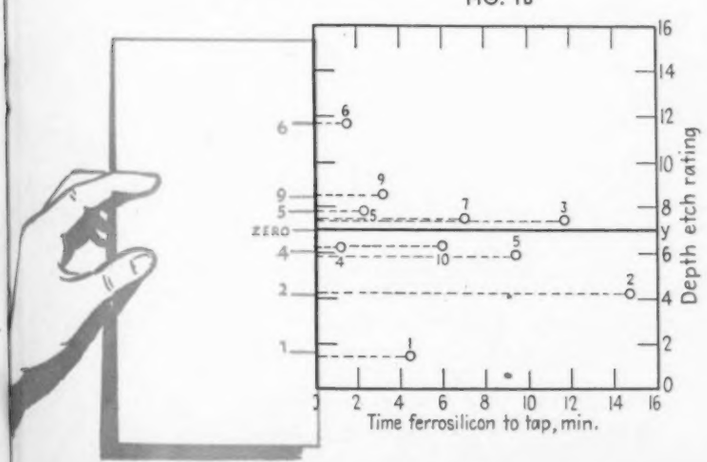
There are times, in the selection of a number to represent the dependent variable, when one is forced to apply the rating good or bad to this variable. A steel sheet is either shipable or not; an analysis is either in or out of specifications. From the point of view of simplicity in the collection of data, this is very convenient; from the point of view of analyzing what has been collected, nothing could be worse. It will be apparent after the most casual thought that there must be many degrees of goodness, and many degrees of badness. If all these degrees of goodness and badness are lumped into two lonely groups, the amount of data that must be analyzed to obtain a given amount of information is increased many fold. A primary aim in selecting a numerical rating to apply to either an independent or a dependent variable must be that this rating shall be as nearly continuous as possible.

There are some variables which do not lend themselves to a continuous rating, such as tar

The increasing use of statistical studies in the steelmaking industry is due to the many problems that lend themselves to statistical analysis for solution. The graphical correlation method, described in this article, appears to present a means whereby the usual cumbersome and complex mathematical methods can be sidetracked. The solution of a specific steel mill problem is presented to indicate the direct application of the method, as well as to suggest the extensive potentiality of the graphical method to the steel industry in general.

vertical deviation applying to other nine points. Paper will then appear as shown in fig. 1B. In fig. 1B line up strip with "zero line" set against index (heavy line *xy*). Points can now be replotted in figure, since strip of paper represents ordinate values and table I indicates corresponding abscissa values. Curve drawn through points then results in curve shown in fig. 4.

FIG. 1B



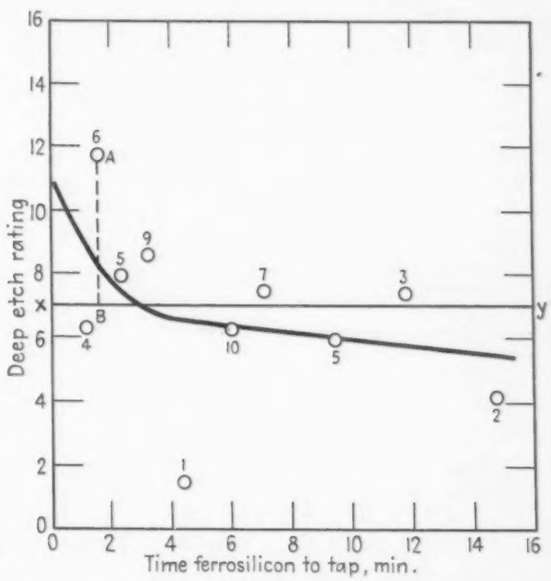


FIG. 4—Vertical deviation from the curve in fig. 1 plotted against time ferrosilicon to tap.

coated molds v. pitch coated molds, or Cliff Shaft ore v. sintered ore, etc. These variables are known as *attributes* because they describe an essential quality of a variable or substance that cannot conveniently be expressed in any way other than a name. The method of handling these attributes will be discussed later.

The mechanics of handling data by the method of graphical correlation and its application to individual data has been very clearly and concisely presented by Mordecai Ezekiel in the second edition of his book "Methods of Correlation Analyses" and will be discussed here to point out the utility and general principles of the method.

Suppose, in a hypothetical case, that one wishes to study the effect of temperature, time final silicon to tap, and percent final silicon, on the deep etch quality of a particular steel, and that to make this study, there are available ten heats. The data are shown in table I. In this study all the independent variables were measured as accurately as possible.

A direct plot of deep etch rating v. each variable is shown in figs. 1, 2 and 3. It is apparent that no accurate conclusions can be drawn from these graphs. The best relationship, temperature (fig. 1), is used as a starting point.

Since no better information is available, it must be assumed that the temperature-deep etch curve is correct as drawn. This curve then explains away the effect of temperature on deep etch quality. The scatter of the points around this curve is assumed to be due to at least in part to the next variable, the time from the ferrosilicon addition to tap.

With this concept in mind, one can readily obtain from fig. 1 the relationship shown in fig. 4. It is obvious that the scatter of points indicated in fig. 4 is much less than in fig. 2, and hence a more accurate estimated curve can be drawn.

The method for deriving fig. 4 from fig. 1 is illustrated by the sketches, fig. 1A and 1B. First cut a narrow piece of paper and place it on fig. 1—as indicated in fig. 1A—in order to obtain the plus and minus deviations from the curve. Transfer the deviation of each of the ten points from the curve drawn onto the marking index as indicated in fig. 1A. The deviations

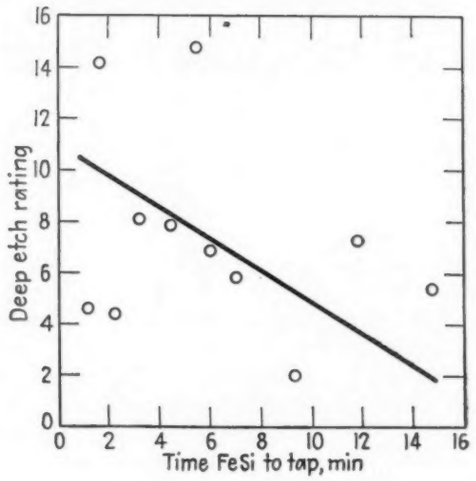


FIG. 2—Direct plot of effect of time ferrosilicon addition to tap on deep etch.

are then transferred to fig. 1B and plotted as deviations from an arbitrary base line (x, y), for corresponding heat numbers, with the zero point of the marking index set against the base line.

In other words, taking heat No. 6 as an example, distance AB in fig. 4 is equal to deviation AB in fig. 1.

The curve, as shown in fig. 4, is then drawn through the points plotted.

This relationship is an improvement over the rough plot in fig. 2, and is shown in fig. 4. Again it must be assumed that the curve in fig. 4 relating the time from ferrosilicon addition to tap v. deep etch quality is the correct relationship. Since deviations from the temperature curve have been used in plotting this new curve, the effect of temperature has been automatically *corrected out*. Repeat the process for the next variable, percent silicon.

The *deviations* of each point from the estimated curve drawn in fig. 4 are now plotted in fig. 5, following the same procedure used in deriving fig. 4 from fig. 1. It can be said that fig. 4 is corrected for temperature, and fig. 5 is corrected for both temperature and time of silicon addition.

The next step in this graphical correlation method is to make a table of the observed deep etch rating for the heats, as shown in table II.

The data for the table are obtained as follows:

Cut a narrow piece of graph paper and mark on it plus and minus values, starting with zero in the center, using the same scale as the one of deep etch used in the previous figures. Using the time curve, fig. 4, place the zero mark *on the curve*, at 4.4 time (heat No. 1), read the minus deviation (−0.1) from this point on the curve to the horizontal line drawn through the average time value of 6.08, and enter it in the table. Repeat this procedure for each heat. Using the silicon curve in fig. 5, repeat this procedure again,

TABLE I

Data for Ten Heats of a Particular Steel, Involving the Effect of Temperature, Time Final Silicon to Tap, and Per Cent Final Silicon, on Deep Etch Quality

Heat No.	Temp., °F.	Time, Min	Si., Pct	Etch
1	2823	4.4	0.50	7.9
2	2832	14.8	0.42	5.5
3	2843	11.8	0.24	7.3
4	2865	1.2	0.58	4.6
5	2889	2.3	0.52	4.4
6	2828	1.6	0.26	14.2
7	2877	7.0	0.30	4.9
8	2897	9.3	0.46	2.0
9	2846	3.2	0.32	8.1
10	2836	6.0	0.35	6.8
Average	2853.6	6.08	0.395	6.57

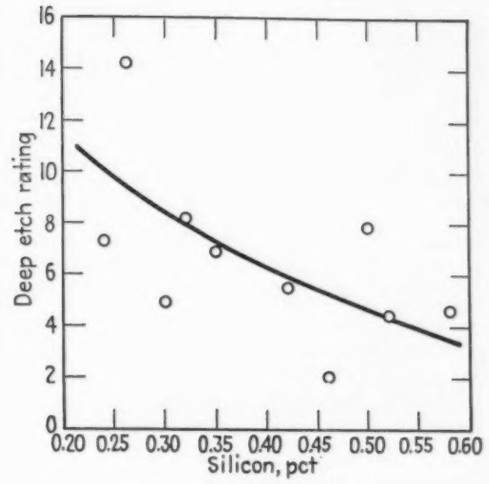


FIG. 3—Direct plot of effect of percent silicon on deep etch.

entering the corrections in the table under "silicon correction." Now apply these corrections algebraically to the observed value, and plot the corrected value against the observed temperatures. This new curve (not shown) will show less scatter and probably a different shape than the first one (fig. 1). Using this latest temperature curve (not shown) and the same curve (and incidentally the same corrections) for silicon (fig. 5), make a new curve for time ferrosilicon to tap.

This process is continued until no further change in the shape and slope of the curves is obtained. In this particular example, the final end result of five such cycles is shown in figs. 6, 7, and 8. There has been a considerable improvement in the fit of the points with consequent assurance in the drawing of the curves. It is advantageous to know quite accurately the effect of each one of the independent variables on the dependent variable when each other variable is held at its average value, so that the practice in making heats can be adjusted to take advantage of this knowledge.

To those mathematically inclined it will be apparent that this method will apply rigorously to only those functions that are additive and have the form: $y = f(a) + f(b) + f(c) + \ldots$ etc. In case this form is not obeyed, and the functional relationship is of the form $y = f(a \cdot b \cdot c \cdot \ldots)$, then all variables can be expressed as logarithms and the method will operate successfully. The type of relationship, whether multiplicative or additive, will not be apparent, and will have to be settled by trial. As soon as the correct form is used, the explained variance will immediately go up and the curves will stabilize very rapidly.

It often happens that the independent variables are not wholly independent of each other, and these interrelationships between independent variables must be looked for and subjected to a common sense interpretation, because if they are strong, the order in which they are dealt with in graphical intercorrecting will have an effect on the interpretation of the final curves developed, but not on the explained variance.

For example, suppose that one is studying the effect of the analysis of galvanized coatings on their short time corrosion rate. By a preliminary plot it is found that both tin content and weight of coating effect the rate of corrosion very strongly. It is evident, moreover, that the tin content and weight of coating are themselves very closely related, due to pot operating variables.

Logic advises that it is impossible for weight of coating to effect short time corrosion rate, and that the true independent variable is the tin content. The tin content is therefore placed ahead of weight of coating in the correcting schedule; and it turns out that weight of coating per se has no effect at all on the corrosion rate, but only appeared to have because of its close association with tin content. The reverse would have been found had weight of coating been used to correct tin content. In case there is doubt as to which of two closely connected independent variables is responsible for the variation in the dependent variable, make a choice and proceed, since it will not effect the explained variance.

When such an impasse occurs, however, a planned experiment can be carried out which will resolve the difficulty and separate the variables as to true independence.

Calculation of Explained Variance

One must now answer another question. Has all the variability, or variance of deep etches been explained? If not, how much is left to explain? This additional information is obtained as follows:

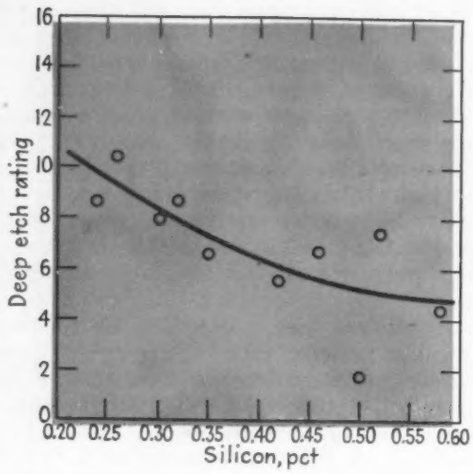
Using figs. 6, 7, and 8, and the actual values of the independent variables on the heats, calculate what deep etch rating should be expected. From the average silicon, time, and temperature, one obtains from the curves an average deep etch rating of 3.9. Again reading the deviation of each heat from its respective average, algebraic corrections to this 3.9 value are applied, *reversing the signs used before.* This calculated deep etch value is shown in table III. The graph of calculated v. observed is shown in fig. 9.

If all the variance were explained by figs. 6,

TABLE II

Corrected Deep Etch Ratings

Heat No.	Observed Rating	Time Correction	Silicon Correction	"Corrected Value" Plot against Temperature
1	7.9	—0.1	+1.4	9.2
2	5.5	+1.0	+0.4	6.9
3	7.3	+0.7	—3.3	4.7
4	4.6	—2.3	+1.7	4.0
5	4.4	—0.9	+1.5	5.0
6	14.2	—1.8	—2.8	9.6
7	4.9	+0.1	—1.8	3.2
8	2.0	+0.4	+0.9	3.3
9	8.1	—0.4	—1.4	6.3
10	6.8	+0.1	—0.8	6.1



IG. 5—Vertical deviation of point from line in fig. 4 plotted against silicon content.

7 and 8, the points would fall exactly on the 45° line in fig. 9. The scatter about this line can be considered as unexplained variance. The best measure of variance is σ^2:

$$\sigma^2 = \frac{\Sigma x^2}{N} - \left(\frac{\Sigma x}{N}\right)^2$$

where Σx^2 = the sum of the squares of the individual numbers, Σx = the sum of the individual numbers, and N = the number of observations.

The σ^2 for the difference between calculated and observed values is 0.092.* The value of σ^2 for the actual data on deep etch is a measure of the total variance. The explained variance is then:

$$\sigma^2 \frac{actual - \sigma^2\ difference}{\sigma^2\ actual} \times 100$$

or, in this case:

$$100 \times \frac{9.6321 - 0.0920}{9.6321} = 99.04 \text{ pct}$$

It is apparent that there is not much use looking for further causes of variation of deep etches.

TABLE III

Deviations of Calculated Etch Values from Actual Etch Values

Calculated Etch	Calculated Etch —Actual Etch	Squares
7.9	0	0
5.4	0.1	0.01
7.8	0.3	0.09
5.1	0.5	0.25
4.5	0.1	0.01
13.7	0.5	0.25
5.0	0.1	0.01
1.5	0.5	0.25
8.2	0.1	0.01
6.6	0.2	0.04

Unfortunately, such a high explained variance is not the usual case in the steel industry. A worthwhile statistical study is one which explains 60 pct of the variance.

Explained variance itself can be used as a tool for an investigation. For example, suppose a study is being made on the effect of various factors on the transverse bend test of a certain steel. A microscopic examination of the specimens shows various types and sizes of inclusions.

** The last term in the above equation is zero when deviation or difference is used, because the algebraic sum of the deviation around the mean should be zero.—Ed.*

After several trials, it can be shown by the improvement in explained variance that only the large inclusions have any effect on the bend test, and effort can be concentrated on diminishing the size rather than the number of inclusions.

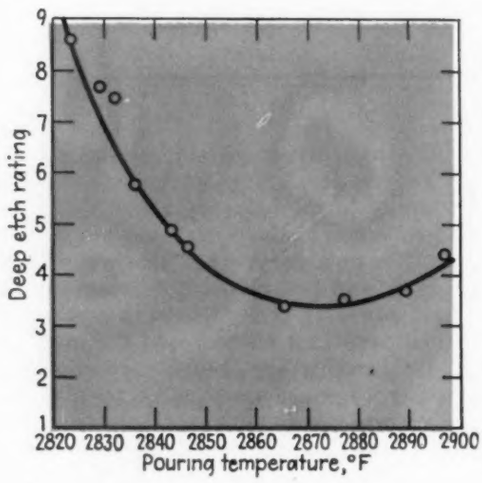


FIG. 6—Final curve showing the effect of pouring temperature on deep etch.

The preceding example on deep etches, unfortunately, must be considered as exceptional, since an unusually exact method of evaluating the independent variables was utilized. Temperatures were measured precisely and analyses and time were both variables subject to exact measurement. A great many statistical studies must perforce deal with inexact measurements; times to the nearest 5 min, estimates of temperature by optical means which may conceivably be off by as much as 100°F, estimates of skull weight, and so on, endlessly. Under these conditions, it is not sufficient to deal with a few heats or items of data; large numbers must be handled, running into tens of thousands in some cases. Fortunately, the method can be expanded to handle this situation with almost the same ease with which it untangled the variables in the preceding example.

The handling of such a mass of data precludes the use of a specific example, to be handled in

detail, so a qualitative description must suffice.

While the handling of up to several hundred data may be accomplished manually by transcribing the data on the independent and dependent variables to small cards, the general availability of sorting and tabulating machines utilizing the punched card system is so universal that only this phase of the problem will be discussed in detail. If machines are not available for the manipulation required, local service can usually be had on contract.

First, all attributes, those variables not readily expressible continuously, must be coded as numbers. A large table of the data is then recorded with all the selected variables expressed numerically. For the sake of simplicity in handling data in these quantities each smallest ultimate group of data (for example, all the pertinent information on a heat) must contain *all* the data with no gaps. If any one heat record contains a gap in the data on any one of the independent variables, it should be discarded, since its inclusion will entail considerable extra work. Another rule that is most helpful is to collect the total number of data, e.g., heats, in multiples of 100. The reason for this will be evident later.

A word of caution must be interposed here. The selection of the independent variables must be made with care or the method will not work. For example, to include in a study of tons per hour the effect of "time start charge to finish charge," and "finish charge to hot metal," as two separate independent variables, one could not simultaneously study the effect of "start charge to hot metal." Since, by use of this method, the variables are each corrected to the average value of all the others, such an inclusion of redundant data would result in instability of the curves. Such precautions apply to any method of analysis; in fact, an instability in the curves may be taken as an indication that such a slip has occurred and it can be located and rectified.

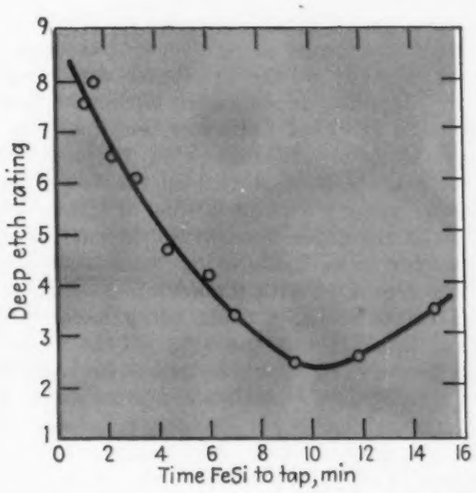


FIG. 7—Final curve showing the effect of time ferrosilicon to tap on deep etch.

Application to Grouped Data

The data as collected and tabulated are then punched into the cards, and the cards then handled in the following manner, the manipulations being done on the appropriate machine:

Suppose that information has been recorded on 1000 heats, and that 20 independent variables, which it is felt may effect the dependent variable, have been selected. All the data are arranged in order of variable No. 1 and grouped into ten groups having 100 heats to a group. The totals for each group are recorded for *all 20 of the independent variables* and for the dependent variable. For independent variable No. 1, there will be 200 averages to calculate. The saving in labor involved in having a convenient number like 100 for the purposes of averaging will be evident, since the machines, as yet, cannot be used to calculate averages.

This same procedure of sorting on the independent variable, grouping and recording the average for each group for all variables is done for all 20 independent variables. This information is made available on a "tape" from the statistical machines. Now proceed in somewhat the same manner as that used in handling the example where there were ten heats instead of 1000.

Usually several of the independent variables are selected to find out whether they exert any important effect on the dependent variable at all. In such a case one must try to determine this before beginning to intercorrect the independent variables. Take the group of ten averages sorted on the first independent variable, and plot the averages of this variable against the averages of the dependent variable for those same groups.

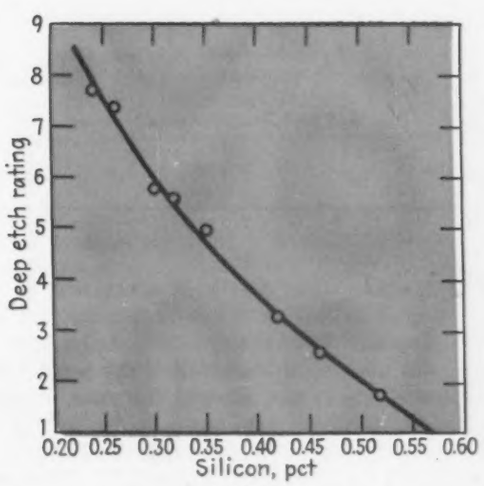


FIG. 8—Final curve showing the effect of silicon content on deep etch.

Each point on this graph has equal weight since it contains an equal number of heats. For some physiological reason it is difficult for the eye to balance up these points in order to estimate the line of best fit. If, however, each point is connected by means of a straight line to the next, in the order of independent variable No. 1, any relationship is readily apparent. A line can then be drawn which is surprisingly close to where the line of best fit would be, if it had been determined by the method of least squares. This procedure is followed for each of the 20 independent variables using for each graph that group of averages based on the sort of the corresponding variable.

An inspection of these 20 graphs will usually immediately eliminate some of the selected variables as having no effect. In case some doubt exists, they may be discarded with reservations, and brought back into the system at any future time without disturbing the study. Suppose that 15 of these variables were immediately eliminated as having no important effect. Take the five remaining and begin the intercorrection to determine their *true* independent effect. If these five variables are all completely independent

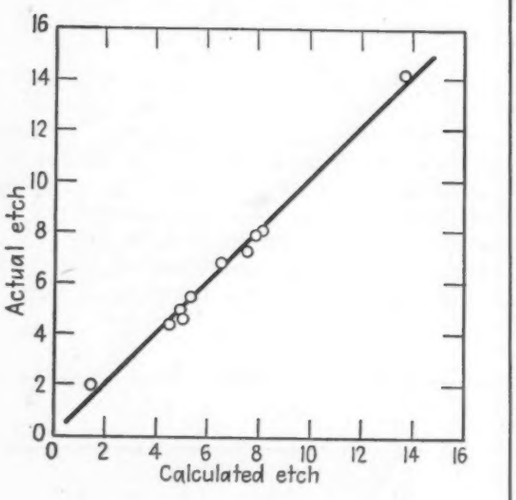


FIG. 9—"Explained Variance" curve.

of each other, then the true effect will be very nearly that drawn on these preliminary graphs, and successive corrections will only serve to eliminate some of the scatter of the points about the line. This is not always the case, however, and corrections must be made.

For identification, one can call the five remaining independent variables A, B, C, D and E. To correct A to the average value of B, C, D and E, it is necessary to use the preliminary curves for B, C, D and E. The same system that was used in the first example on ungrouped data can be used to do this. Take the average values of B, C, D and E associated with each of the ten groups obtained by the sort on A. Using these averages, and the preliminary curves, construct a table exactly like the one constructed in the example on deep etch discussed previously. Make the algebraic corrections using the average values of B, C, D and E associated with the sort on A and the preliminary curves of B, C, D and E obtained from their respective sortings, and plot the corrected value of the dependent variable against independent variable A.

This curve may now be considered to be more nearly a correct relation between A and the dependent variable, and as such should be used in correcting the curve of B v. the dependent variable to the average value of A, C, D and E. Using this corrected curve for A, and the preliminary curve for C, D and E, follow the same procedure in correcting the preliminary curve for B, being sure to use the data for A, C, D and E associated with the sort on B. The same sequence follows for the other variables. The number of approximations or cycles necessary to stabilize these curves varies with the degree of association of the independent variables among themselves, but rarely exceeds five or six.

The calculation of the explained variance is done in the same way as for the individual data. The curves obtained from the grouped data are used to back calculate the dependent variable for *individual* data, not the grouped data, since the interest is in knowing how well the behavior of individual heats can be predicted. It is sufficient to calculate the explained variance based on a sample of about 50 to 100 points selected to cover both the period of the data and the range.

After this phase of the study has been completed, a study of the attributes can be undertaken. Suppose, as suggested earlier in this discussion, a group of heats has been included in a study using a different kind of mold wash. These heats will be plotted on the 45° explained variance graph. The deviations of the calculated values of the dependent variable from the actual values for those heats using mold wash A, will now be compared with the deviation of the calculated values of those heats using mold wash B, taking into account the sign of the deviation. This comparison must be made in accordance with recognized statistical procedures particularly in case the difference is small. If the difference is marked, a visual examination of the position of the points, whether they are all above, or all below the 45° line may suffice.

In general, it would appear that massive studies, that is, those involving large numbers of data—occasionally necessary to undertake—are the result of two things. The first and probably the most important is inaccurate data. When such a situation arises, only a limited amount of variance can be explained. The inaccuracies of data cause a fairly large portion of the variance to become unexplainable, and no study, no matter how large, will explain additional variance. The second is that in a great many processes the important variables are not known, so everything is recorded that even has a remote chance of having an effect. Under these conditions the only thing that can be done is to use enough data to obtain average curves.

Kolene Process Aids Silver Brazing of Cast Iron

By E. RUSSELL ATKINSON

Kelsey-Hayes Wheel Co., Division French and Hecht, Davenport, Iowa

THE Kolene process of preparation of cast iron for silver brazing has made it possible to silver braze cast iron to steel economically and on a high production basis. Heretofore, silver brazing of cast iron to steel had been considered impractical due to the presence of scale, graphite and sand inclusions in the cast iron.

The Kolene process is a combined cleaning and surface preparation method which produces a pure ferrite surface, which is necessary in order to successfully silver braze cast iron to steel. It is a catalyzed molten salt bath, melting point of 500°F, and operating range of 850° to 950°F, plus a sequence of oxidation and reduction cycles regulated according to size and shape of parts and surface desired. This process, plus the proper flux and silver brazing alloy makes possible a bond in which the cast iron member will break before the bond.

The Kelsey-Hayes plant has successfully silver brazed a cast iron cylinder to a steel stamping, which assembly must withstand a 300 ft-lb torque test before breaking bond between cylinder and stamping. This assembly must also pass an air test for leakage, therefore porosity of bond is not permissible. These requirements have been met and greatly exceeded on a high production rate with nonskilled operators.

The operating procedure is such that partly-machined cast iron cylinders are placed on a rack, holding 128 pieces, and suspended from a cross-bar which contacts the edges of a steel tank, allowing the parts to be immersed in the catalyzed molten salts operating at 820°F. The pieces are allowed time to heat to the salt temperature before oxidation and reduction cycles are started. The bath is actuated by a 6-v dc current that draws approximately 350 amp per rack load. Oxidation and reduction cycles are controlled by means of a reversing switch, the work forming one pole of the current and the steel tank forming the other.

After processing in the salts, the rack containing the cylinders is moved by a conveyer type hoist, lowered first into a cold water rinse and then into a hot water rinse. The pieces are then allowed to air dry. Time for the process, on 128 pieces, is as follows:

Heat in salts for	**6 min at 820°F**
First reduction	**5 min**
Oxidation	**4 min**
Final reduction	**6 min**
Cold water rinse	**1 min**
Hot water rinse	**2 min**

Loading and unloading of racks in a continuous process enables the operator to process 328 pieces per hr.

The following operations are then performed to complete assembly through the silver brazing operation:

(1) The contacting surfaces of the cylinder are treated with Handy & Harman Co. Handy Flux and pressed into the stamping, the flux acting as a lubricant when pressing the cylinder in place.

(2) Assemblies are then moved to a 30-kw Lepel converter which is equipped with an automatic timer, two 6-position fixtures and change-over switch which makes it possible to heat six assemblies while unloading and loading other fixture in which six assemblies have been heated.

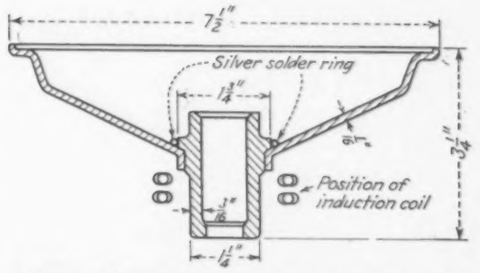


FIG. 1—Sketch of part consisting of a cast iron cylinder silver brazed to a steel stamping using the Kolene process for preparing the surfaces for brazing.

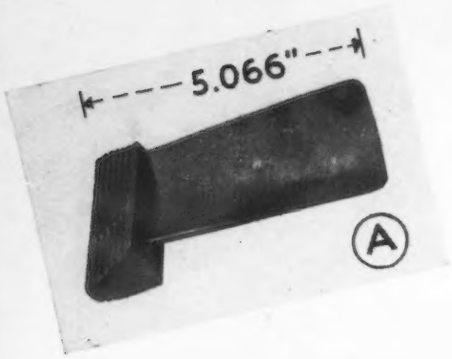
(3) Apply flux to cylinder and press into place on the hydraulic press (production rate 304 pieces per hr).

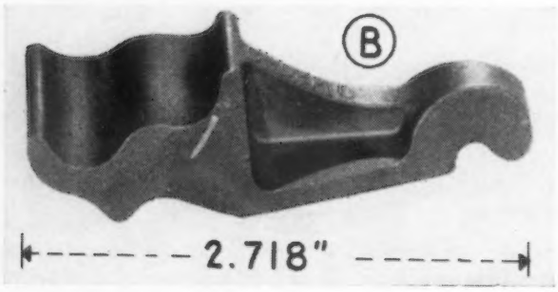
(4) Place six assemblies in a fixture, apply additional flux, place preformed silver brazing alloy ring around flange of cylinder and throw switch. Time for brazing six assemblies is 90 sec during which time a second fixture is unloaded and loaded and flux and ring applied.

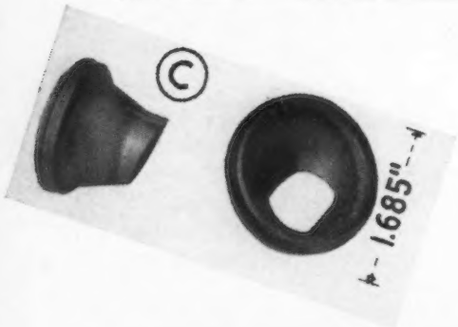
(5) Continuous operation enables the operator to silver braze 235 assemblies per hr.

(6) A preformed 1/16 in. wire diam Easy Flo No. 45 ring, which melts at 1120°F and flows at 1145°F, is used for the brazing operation.

A Realistic Appraisal of the . . . Precision







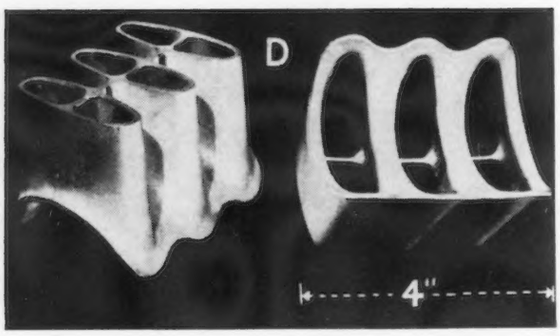


FIG. 1 — Typical precision cast parts which illustrate effective use of the investment casting process. The castings, of various Haynes Stellite Co. alloys, are (a) blade for Allison gas turbine engine, (b) sealing segment made for Basca Mfg. Co., (c) diesel combustion chamber cup made for Waukesha Motor Co., (d) jet outlet nozzle and (e) a John Deere seed knocker.

PARTS made by the precision investment casting process do not compete on a price basis with parts normally made by screw machine operations, or with forgings, coinings, stampings, diecastings, or other simple castings which are readily machined. The precision casting process is, first, a means of producing shapes in steel or other machinable metals that cannot be economically made by other methods of manufacture, and, second, a means of producing intricate shapes in harder alloys that are difficult or impossible to forge or machine or grind. Gas turbine parts, such as the blade for the I-40 engine shown in fig. 1, are an outstanding example of the proper application of precision casting. These parts are made in Stellite alloy No. 21, which is difficult to forge because it is strong at elevated temperatures, and the shape is not readily reproducible by machining or grinding operations. Other typical examples of successful applications of precision castings are shown in fig. 1.

The purpose of this article is to acquaint designers, production men and purchasing agents not only with the advantages of the process but also with its present limitations.

This discussion is based on experience gained at the Haynes Stellite Co. and is pertinent only to alloys with relatively high melting points. Precision castings have been made in aluminum, magnesium, bronze or other copper-bearing alloys using plaster molds, but the opinions expressed in this article may not be applicable to these materials. The author recognizes that closer tolerances, thinner edges and other characteristics can be obtained under laboratory conditions or other circumstances where special handling is involved. The opinions expressed here cover what is currently commercially practicable. Constant effort is being made to improve patterns, investment materials, casting techniques, and other phases of the process. It is hoped that the scope of the process can ultimately be broadened through such improvements.

Precision Casting Tolerances

The term *precision investment casting process* does not actually mean that castings will be held to tolerances measured by fractions of a thousandth of an inch. The term *precision* is, perhaps, a misnomer because it means one thing to a design engineer and something else to a foun-

Investment Casting Process

By W. O. SWEENY
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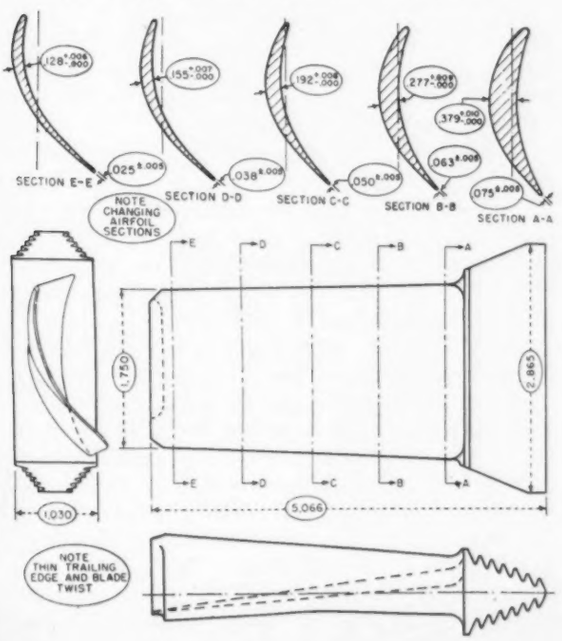
The true technological status of the precision investment casting process has been shrouded by the somewhat overly enthusiastic claims made in the past for the process which have served to confuse designers and embarrass casting producers. The article presented herewith is intended to provide designers and casting users with a sound, realistic understanding of the advantages and limitations of the precision investment casting process. Among the subjects covered are tolerances, holes, walls, edges, threads, surfaces, size, weight, inspection and coats.

dryman. Precision castings are held to close dimensions when compared with sand castings, but they do not compete too well with the tolerances obtained by precision machining or grinding. At the present time we believe ±0.005 in. per in. with a minimum tolerance of ±0.003 in. is commercially practicable. This means that in order to have a tolerance of ±0.003 in. the dimension in question must be 0.60 in. or less. These tolerances cannot be held across parting lines or on surfaces into which it is necessary to gate.

THIS drawing shows the contours and sections of the turbine blade illustrated in fig. 1A. The complex shape that must be reproduced is emphasized by this sketch.



The yield of satisfactory casting is directly proportional to the dimensional tolerances allowed. The greater the tolerance, the greater the recovery, and, consequently, the lower the cost of a part. Since a price penalty must be put on close tolerances, all tolerances which are not critical should be widened as much as possible. For those surfaces where finishing operations are required, 0.010 to 0.030 in. of stock per dimension is satisfactory, but the actual amount has to be determined by the practice of individual users.

HOLES—Generally a small (up to ¼-in. diam), shallow (approx ½ in deep) hole can be held to a tolerance of ±0.003 in., both with regard to location (if dimension is 0.60 in. or less) and diameter. Larger or deeper holes require wider limits. Small blind holes cored with refractory material can be held to ±0.003 in. on diameters but not on location. Deep holes, except in hard, brittle alloys, can be successfully cored with refractory material. Holding a tolerance on holes is based on the provision that the hole does not have a parting line in it. The elimination of parting lines in holes frequently necessitates loose cores. Closer tolerances can be obtained with castings that have no parting lines, but more handling is required and the cost of the part is increased.

Some metallurgical and design considerations affecting precision investment castings were covered in the article "Limitations on Precision Cast Parts," by N. J. Grant, THE IRON AGE, *Aug. 7, 1947, p. 62.—Ed.*

The smooth surface common to precision investment castings is partly the result of hand grinding to remove surface irregularities. These minor projections cannot be readily removed in small holes. Consequently, such holes, when

measured on a pin, frequently appear to be undersize. This fact should be remembered if the hole is to be used as-cast, so an allowance of a few thousands of an inch can be made to compensate for this roughness.

If the cast hole is to be finished, this roughness will be removed when the hole is machined or ground to size. If the hole is cast "tap drill size," the possibility of excessive tap wear due to the

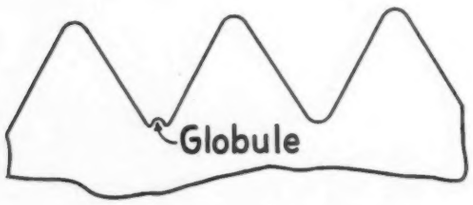


FIG. 2—The principal objection to casting serrations is the possibility of small globules, such as shown here, occurring in the root of the serration.

presence of small surface irregularities must be taken into consideration. It is advisable, in most alloys, to plan on removing a small amount of metal by drilling or reaming so as to have parent metal exposed for the tapping operation. When only a 75 pct or less thread is required, the hole should be made slightly oversize to compensate for surface irregularities.

When refractory material is used as a core, it gives a much smoother hole than if the hole is allowed to core itself with investment material. Refractory cores result in closer tolerances. However, this generally involves a slightly higher cost for the casting.

The minimum size hole that can be cored is dependent upon the amount of surrounding metal. Thus, a small hole which can be cored in a light section might not be practicable in a heavy section. The minimum size hole that can be cored practicably is 0.050 in., even in light sections.

Special soluble wax can be used for holes of intricate shape and for holes where the core cannot be withdrawn readily from the wax pattern, because of a recess or some other structural reason. However, this procedure is fairly costly and it is not possible to hold tolerances as close as with retractable steel cores.

WALLS—The minimum wall thickness which we consider practicable for production is approx 0.050 in. for a uniform small section. It is possible to have a minimum wall thickness of 0.030 in., provided there is sufficient taper from end of the casting to the other. The wall thickness can generally be held to a tolerance of ±0.005 in., except in the case of soluble cores, where a tolerance of ±0.010 in. is required.

EDGES—Approx 0.012 to 0.015 in. is the minimum practical edge thickness, provided everything else about the casting is favorable to the production of thin edges. It is necessary to have a gradual tapering rather than an abrupt sectional change to obtain the minimum thickness. Moreover, it is not feasible to have a heavy section immediately adjacent to a very thin section. Thinner edges can be cast, but the recovery is generally lower and the handling problem is multiplied, increasing the cost of the part. For parts subjected to high temperature, a minimum edge of 0.025 in. is recommended for metallurgical reasons. Thermal stresses created by the differential rate of cooling between thin and heavy sections are liable to crack edges which are too thin. Also, such edges are easily damaged in shop handling and in service.

The peak of serrations can be cast with a 0.005 in. radius, particularly with a fine pitch. The principal objection to casting serrations is the problem of eliminating small globules of metal in the root of the serration, as shown in fig. 2.

THREADS—Precision casting of threads should be limited to alloys or sizes that can be readily machined, tapped, or ground. We believe that a class one fit thread is the best that can be precision cast. Unless a loose core is used, external threads will have a parting line. Internal threads do not have a parting line, as the metal core chases the wax, but they add to the

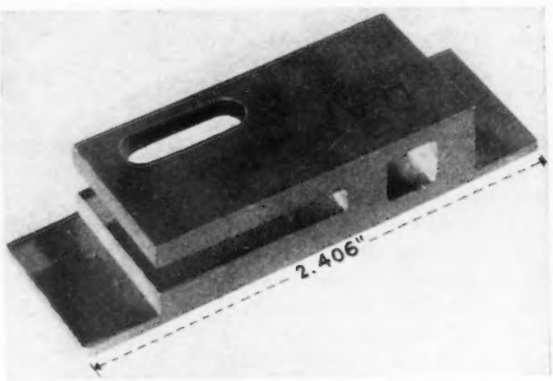


FIG. 3—A precision investment cast part for an oxyacetylene blowpipe.

cost as the removal of the metal core from the wax pattern is fairly slow.

Globules of metal in threads are a serious problem, particularly in the threads of hard alloys. It is difficult to clean them out satisfactorily by hand grinding, and they shorten tool life when the thread is chased.

In order to cast threads, the master pattern must have a pitch compensated for shrinkage. This must be quite accurate, particularly on long sections, or the pitch of the thread of the casting will be incorrect. Generally, it is more economical to thread the part by machining, tapping, or grinding, than to cast the threads.

SURFACES — Castings from investment molds generally have smoother and cleaner surfaces than are normally obtained from other types of molds. It is rather difficult, however, to obtain satisfactory commercial recovery of castings of medium and large size without minor surface flaws. The larger and flatter the surface area to be cast, the greater the likelihood of obtaining small surface imperfections. The smooth surfaces are in part the result of hand grinding which removes surface irregularities. In areas

which cannot be readily ground, these areas will be rougher than the standard accepted precision casting finish, as fig. 3 shows.

Both parting lines and draft are necessary in precision castings. The amount of draft should be as generous as permissible, yet it can be as little as ½° per face. For the average piece the parting line is approx 0.002 in. thick by 0.006 in. high.

The part should be studied so that the precision casting manufacturer can be given the following information:

(1) Those surfaces which should be free from pits.

(2) Those surfaces into which it is not desirable to gate.

(3) Those surfaces on which no draft is permissible.

(4) Those surfaces on which there should be no parting line.

This information is a vital factor in properly pre-engineering a precision casting job.

Some applications, such as parts for gas turbines and food machinery, do not permit even minor surface pits, but for many industrial applications, minor pits on one or more surfaces are acceptable. This information should be conveyed to the precision casting producer so that the price will be based on the surface finish required.

SIZE—The size of a casting is limited primarily by the die. For cast soft metal dies, current restrictions are a cross-section of 10 x 5 in., with lengths of about 10 in., but dies up to 20 in. long are feasible provided the cross-section of the part is much smaller. For example, with shapes where the die can be machined out of aluminum or other suitable metal, the die is not the limiting factor, but rather injection equipment size, flasks, and other equipment.

The largest part which Haynes Stellite has produced commercially is a bracket for Westinghouse Electric Corp., shown in fig. 4. This casting weighs about 5 lb.

WEIGHT—Weight of a precision casting is subject to the size limitations previously discussed. The maximum weight of an individual casting is dependent upon the method of casting. For pressure casting in an indirect arc tilting furnace, where air pressure is turned on after the furnace is inverted, the current maximum is approx 3½ lb. There is no minimum weight limitation except that due to thickness, hole size, and the other limitations already mentioned.

INSPECTION—Haynes Stellite Co. has facilities for the types of inspection listed below. As a means of control, one or more of these types of inspection are used on all sample castings and also for spot checking. However, the sales price on a part definitely reflects the type and stringency of inspection required. Thus, for example, the Pratt & Whitney Aircraft Corp. exhaust coupling, shown in fig. 5, used on the Wasp Major engine, is X rayed in two positions to assure that the casting is free from shrinkage or other harmful defects. However, there are many parts in which microshrinkage is not detrimental.

When X-ray soundness is unnecessary, it should not be specified, since the cost includes not only the labor and material used in the X-ray examination, but also includes the cost of castings which would be rejected because of minor internal defects. Thus, the price for a part which is X-ray sound will be higher than for a part which can have minor defects.

It is customary practice at Haynes Stellite to X-ray all sample castings until the foundry technique is worked out. Further X-ray depends upon whether or not this means of inspection is

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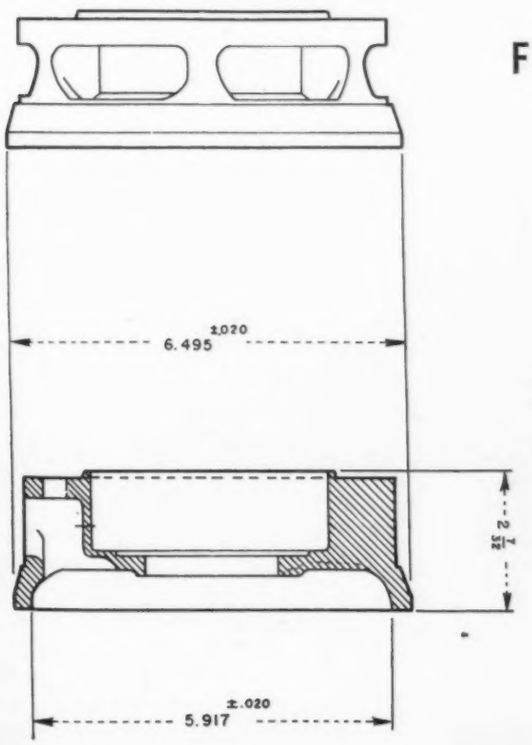

FIG. 4—The largest precision cast part produced commercially by Haynes Stellite is this bracket weighing about 5 lb.

specified because of the service requirements of the castings.

Fluorescent penetrative oil inspection is used on nonmagnetic alloys to reveal cracks and similar defects, if the service life is such that these defects are harmful.

All castings are visually inspected for pits, surface smoothness, and other obvious defects. The standard of inspection varies, depending upon the part. Therefore, it is important that the essential requirements be stated because the cost of inspection is included in the price of the casting.

Castings are checked to determine whether

FIG. 5—Pratt & Whitney exhaust manifold coupling cast in stainless type 347.

the dimensional variations come within the blueprint tolerances. The more close tolerances there are, the more checking is required on each individual piece. This is reflected in a higher sales price. For gas turbine parts, gage inspection is also used to determine whether or not the contour conforms to the drawing.

It is a sound policy to furnish sample castings before starting into production, particularly if the production requirements are large. Frequently a small number of parts is required for preliminary investigation, but it is recommended that production equipment be made in the very beginning so that the sample parts will be representative of what can be expected in larger quantities.

Most of the parts which have been submitted to Haynes Stellite for quotation have previously been made by some other method of fabrication, and so the design has been limited by the method of manufacture. For example, slots usually have square corners because they have been milled into the part. From the standpoint of strength and ease of casting, it would be better to have a generous fillet. The possibility of making one integral casting take the place of two or more parts previously assembled should also be investigated. In designing precision casting parts, the engineer is no longer restricted by machining or forging limitations. Frequent modifications which give better service life also result in lower casting prices.

Summarizing, then, the precision investment casting process has a definite and important place in industry. The process is not designed to compete on a price basis with low-cost means of mass production, but it does fill a definite need where there are shapes or alloys that are difficult to machine, forge, or form. The tolerances that can be held are not as close as someone unfamiliar with the process might think. Perhaps the best use of precision casting is the casting of intricate contours and shapes that are expensive to machine or grind with subsequent low-cost finishing operations for bearing surfaces and other close tolerance dimensions.

The design engineer is now able to consider the shape and alloy that will give him the optimum service efficiency and life, without regard to conventional means of manufacture. The precision casting process will continue to find applications in the economical production of intricate shapes and hard-to-work alloys, and the fullest development of the process will come through wider knowledge of its possibilities and limitations and through cooperative efforts between designers, users, and precision casting manufacturers.

. . . NEW BOOKS . . .

"Handbook of Industrial Electroplating," by E. A. Ollard and E. B. Smith. Collation of industrial electroplating information for the benefit of those interested in the design, construction, operation and maintenance of electrodeposition plants, and also for those laboratory workers concerned with the testing and maintenance of plating solutions. The text is solely concerned with the practical aspects of installing and maintaining electrodeposition units. Louis Cassier Co. Ltd., Dorset House, Stamford St., London, S. E. 1. 308 p. 15 s. ($3.00).

* * *

"Heat Pumps," by P. Sporn, E. R. Ambrose, and T. Baumeister. This work is a presentation of the basic material on heat pumps and their industrial and architectural applications. The fundamental principles of heat pumps and practical information on their design, installation, operation, and maintenance is provided. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. 188 p. $3.75.

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"Custom House Guide" (1947 edition). The 85th annual edition of this well known foreign trade guide contains an index of 30,000 commodities, giving the applicable custom rates of duty, including Reciprocal Trade Agreement rates, along with sections on customs regulations; the Internal Revenue Code; port activities, facilities and charges; and a directory for shippers and those in allied trades. Custom House Guide, Box 7, Sta. P, Custom House, New York 4. 1620 p. $20.00.

Bright Annealing Replaces Pickling In Porcelain Enameling Plant

By A. R. MALLONN
Republic Stamping & Enameling Co., Chicago

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FOR the past 16 months, Republic Stamping & Enameling Co. has been using a bright annealing operation to replace cleaning and pickling of kitchen ware prior to porcelain enameling. This new method has worked out satisfactorily from the standpoint of cost as well as surface quality.

The bright annealing operation consists of heating, in a controlled reducing atmosphere, the metal to a temperature high enough to burn off foreign matter. The atmosphere is designed to prevent harmful surface reactions and to chemically bring about the restoration of oxidized surface metal.

The bright annealing is performed in a General Electric roller hearth type furnace with a heating chamber 18 ft long and a cooling chamber 70 ft long. The furnace is rated at 325 kw and can be operated at temperatures up to 2100°F. The 70-ft cooling chamber is water-jacketed. This lowers the temperature of the work to handling temperatures at the discharge end.

This article is an abstract of a paper presented at the Ninth Annual Porcelain Enamel Institute Forum.—Ed.

Handling is reduced to a minimum by automatic operation involving the use of conveyers and electric eye controls, and the furnace is equipped with a 2000 cu ft per hr atmosphere generator. The cost of such a furnace ranges from $35,000 to $50,000.

Over a period of 3 months, electricity used in this operation has averaged 5.5 kw per 100 sq ft of metal cleaned using both sides. Figuring 1.5¢ per kw, this equals a cost of 8.3¢ per 100 sq ft of surface cleaned. By using transfer tables and return conveyers, the labor cost 7¢ per 100 sq ft. The natural gas used in the atmosphere generator, figured at 45¢ per 1000 cu ft, gives a cost of 0.5¢ per 100 sq ft.

These charges total 15.8¢ per 100 sq ft, as compared with a cost of 20.3¢ for cleaning and pickling, a saving of approximately 25 pct. These savings, which will vary with the type and size of furnace used, are due largely to the fact that one man does all the unloading and dividers are not necessary. The ware can be tightly nested or stacked, which, in the case of Republic's installation, is six pieces high.

Production in this bright annealing operation has averaged, over the past 3 months, 2276 sq ft of metal per hr. This area is equal to 754 lb. Furnace manufacturers suggest that it is necessary to figure $900 per year maintenance to cover lubrication belt or tray and all other repairs.

There has been considerable discussion to the effect that the metal has to be washed before going through the atmosphere anneal. This is not necessary so long as the ware is not coated with a pigmented compound, heavy oil or grease. Oil soap and soluble oils have been used with good results.

The cleaning action is threefold. First, the furnace temperature volatilizes the impurities. Second, the flow of gas creates a washing action which flushes this from the surface of the parts. Third the constituents of the gas ($CO+H_2$) react with the surface oxides on the ware and reduce them to pure metal. These surface oxides from electric welding, when reduced to pure metal, tend to strengthen the weld itself. Acetylene welding cannot be cleaned up completely by atmosphere annealing. A fine loose metallic powder remains which can be easily brushed off.

This method completely eliminates pickle blisters and fish scale as well as other defects which have been attributed to pickling.

The dipping (and probably draining) of the ground coat is easier as the surface is a clean, neutral one with no alkali or neutralizers to hold or retard the flow of enamel. The ware that has been atmosphere annealed does not tend to rust any sooner than pickled ware.

As for the standard tests set up by the Enameled Utensils Mfg. Council, there is no difference in results between annealed and pickled ware.

Bright annealing makes possible the replacing of messy pickling tanks with clean, dry furnace equipment. Operating personnel is substantially reduced, stresses from drawing and welding are relieved, and nonenameling or commercial grade stock can be used.

The biggest difficulty is getting the proper tooling to support the ware to eliminate warping. To this end Republic has been successful with kitchen ware.

There has been considerable work done with preheating the work which tends materially to reduce warpage when the work enters the high heat chamber.

It is necessary to point out that with this method of preparing metal for enameling or painting, temperatures (which have been as low as 1450°F), time in furnace, tooling and loading will differ considerably between flat ware and deep drawn welded ware and ware that has become very rusty. The deep drawn ware usually has a heavier coating of drawing compound and may need a slightly higher temperature than flat or shallow ware, although it has never been necessary to do anything further to bright annealed ware in the Republic installation. The ware is taken directly from press or stock room through the furnace directly to ground coat dipping.

Solidification Of Steel Ingots

By J. R. FLECHE
Republic Steel Corp., Cleveland

A better understanding of the functioning of ingot molds and requirements in their design is a matter of importance to the steelmaking industry. The author attempts to attain these objectives by presenting a mathematical study of the derivation and utilization of K, which is a comparative measure of linear freezing speed. Methods of applying K values to steels of various carbon contents are given in this third part of a four-part article.

C. B. POST and associates[2] have shown that in the air cooling of steel bars, the speed of cooling at the center = a constant x $\left(\frac{\text{cooling surface}}{\text{volume}}\right)$ 1.1154, regardless of the shape. They have also shown[5] that in liquid quenching the isothermals are far from following the contour of angular sections and are located much deeper at corners, while the center speed drops quickly when the width increases and becomes practically steady when the width reaches four to five times the smallest dimension, thus indicating a quick neutralization of cooling effects having a direction at 90°.

By contrast, freezing of an ingot by its mold has the following features: (1) For each mold shape and the same relative wall the average speed of freezing, measured up to complete

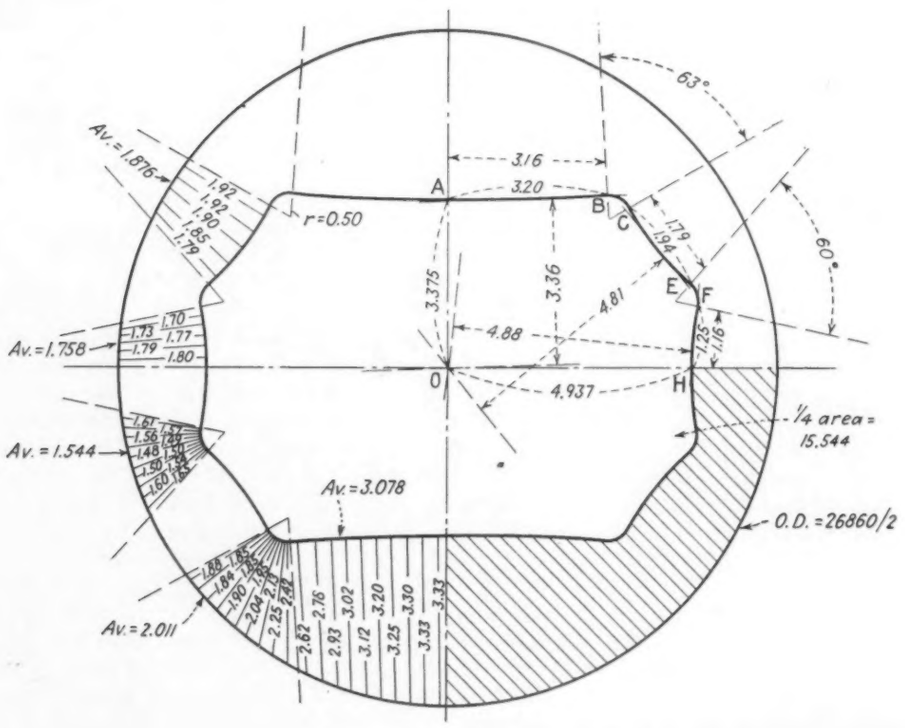

FIG. 22 — Cross-section under the hot top of a short 14x20-in. ingot.

solidification, is directly proportional to the ratio cooling surface: volume—both characteristics are inversely proportional to the radial vector under consideration**; (2) for the same mold shape a heavier wall causes an increase in freezing speed and therefore acts as a more drastic quenching medium; (3) similarly, for different mold shapes, the concave wall is more efficient than the flat wall and has also the same

Fundamental concepts regarding solidification of steel ingots and corrections to K values to permit comparisons with other types of steels and ingots, were discussed in the first two parts of this article, THE IRON AGE, *Oct. 9 and Oct. 23.—Ed.*

effect as a faster quenching bath; (4) the presence of an inner core of liquid steel and the relative slowness of the freezing operation towards its end account for progressive solidification boundaries following more closely the contour of the cross-section and for cooling effects from several directions adding more freely than in liquid quenching; (5) in other words, ingot freezing is very comparable to liquid quenching of slight intensity with the cooling power decreasing gradually due to progressive saturation of the mold walls with heat.

Reproducing by calculation the K values observed on the two flat ingots of Nelson—The corresponding cross-sections under the hot top are given by figs. 22 and 23. The procedure for computation is such as already explained except on one point—many faces of the molds are here convex towards the ingot and imply a reduced cooling power, compared to flat walls as already explained. No formula for such a case being available, a relation could be derived on the basis

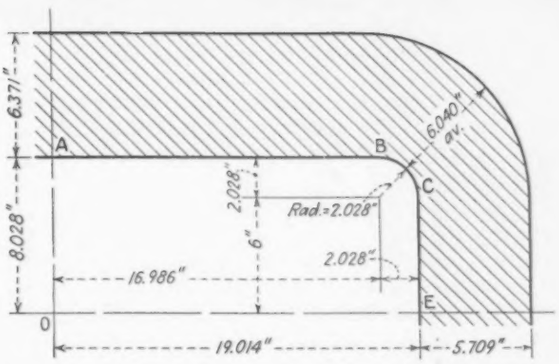

FIG. 24—Section of a 71-in. high, open top mold, estimated at top steel level.

of considerations to be disclosed later (fig. 29). These, however, would be based on a cooling

** with $D = K\sqrt{T}$, $\sqrt{T} = \frac{D}{K}$, or $T = \frac{D^2}{K^2}$,

and average speed $\frac{D}{T} = \frac{D}{D^2/K^2} = \frac{K^2 = \text{constant}}{D}$,

while $\frac{\text{cooling surface}}{\text{volume}} = \frac{2}{D}$

power fading more quickly through the wall due to lesser wall material. As a short cut, the same idea can be utilized by replacing the contact line of such convex walls by their average line at one fourth of the wall thickness from the ingot as drawn in the sketches. As a matter of fact, the calculations in tables IV and V tend to indi-

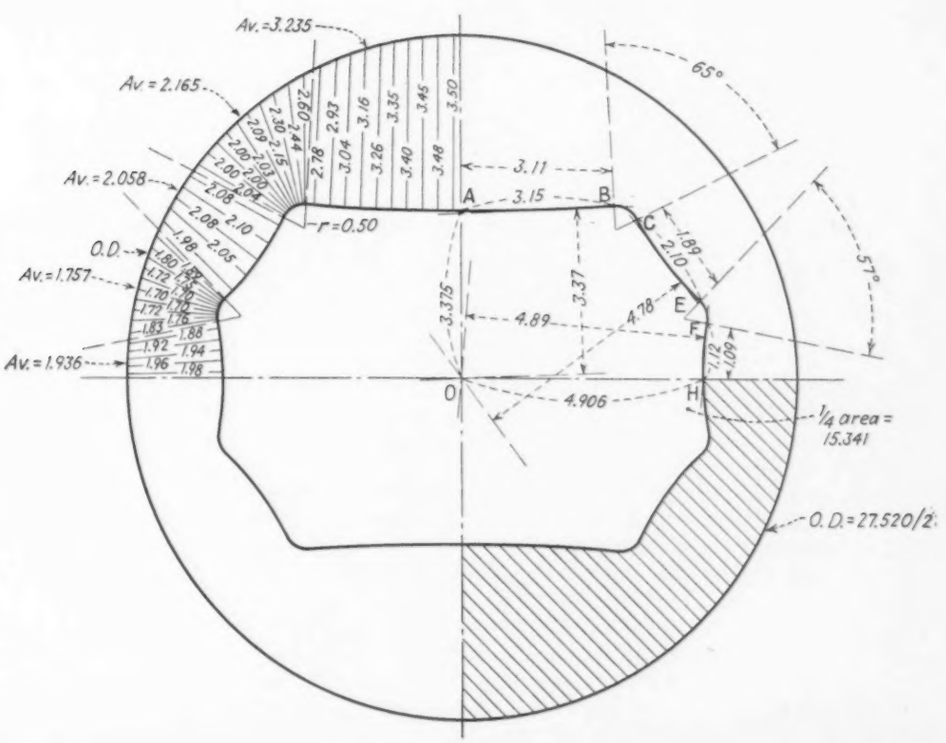

FIG. 23 — Cross-section under the hot top of a long 14x20-in. ingot.

cate that these convex walls are 1.05 less efficient than the flat walls for the short 14 x 20-in. ingot (table IV) and 1.034 less for the long 14 x 20-in. ingot (table V)—which is very well in line with the previous finding that the concave walls are 1.069 times more efficient than the flat walls.

The duplication of experimental K values is thus quite close, even in the case of such complicated mold shapes as shown in figs. 22 and 23. This tends to give weight to the various formulas developed and the various notions connected with efficiency, transposition and corrections for various reasons.

Chipman and Fondersmith's experiments[3] at American Rolling Mill Co., made on rimmed steel or ingot iron, should present the opportunity to detect the influence of carbon content of the steel on freezing time, by comparison with the time obtained with previous formulas, all related to 1.00 pct C steel. These authors also observed that the rate of freezing is not affected by blowholes. It is therefore assumed the K value observed holds for solid steel, taken here as representing 0.07 pct C. Experiments were made on a single size of flat ingot 18x39x70 in. A section view of a 71-in. high, open top mold, estimated at top steel level, is shown in fig. 24. Time computed from instant of contact between steel and mold is the same as in the above calculations. The relation obtained was $D = 0.90\sqrt{T} - 0.12$.

Figuring the K value for 1.00 pct C steel gives a ¼ ingot area of 151.6925 sq in., see table VI. The value $K = 0.8863$ (table VI) has been derived from the Armco relations as follows:

The latter equation (16) has a constant (—0.12), which introduces 1.06 sec at the start of solidification, but as much as 2.4 min at the end, compared to the straight relation $D = 0.90\sqrt{T}$. The following remarks however, will show that the phenomena represented by the Armco equation and by the data contained herein, are quite comparable and can be covered by a single type expression—as is necessary to make a comparison.

Fig. 25 is a reproduction of fig. 3 of Chipman and Fondersmith's paper. Calculating $\sqrt{T}$ from their formula, equation (16), and K up to the time values as in this article, at every inch, gives the values as noted on skew lines in fig. 25. It is immediately apparent that such K values go increasing with time, just as was observed for

TABLE IV

Calculation of K Values for the Short 14 x 20-in. Ingot

Fig. 22 — Area = 15.544, at scale — Experimental (K) on OA = 0.9605 (fig. 11E)

Element AB:

$$K \text{ on OA} = 0.64257 \times \left(\frac{3.078}{3.36}\right)^{0.219} \times \underbrace{\frac{3.20}{15.544/3.36}}_{\text{Efficiency}} \times \underbrace{\frac{3.375}{3.36}}_{\text{Transposition}} \times \underbrace{\frac{3.16}{3.20}}_{\text{For Convex Wall}} = 0.43236$$

Element BC:

$$K \text{ on OA} = 1.3739 \times \left(\frac{2.011}{0.50}\right)^{0.219} \times \frac{\pi \times \overline{0.5}^2 \times 63^\circ}{360^\circ \times 15.544} \times \frac{3.375}{0.5} \times \frac{1}{2}\left[\left(\frac{0.5}{3.375}\right)^{0.219} + \left(\frac{0.5}{4.937}\right)^{0.219}\right] = 0.07033$$

Element CE:

$$K \text{ on OA} = 0.64257 \times \left(\frac{1.876}{4.81}\right)^{0.219} \times \frac{1.94}{15.544/4.81} \times \frac{3.375}{4.81} \times \frac{1.79}{1.94} = 0.20315$$

Element EF:

$$K \text{ on OA} = 1.3739 \times \left(\frac{1.544}{0.50}\right)^{0.219} \times \frac{\pi \times \overline{0.5}^2 \times 60^\circ}{360^\circ \times 15.544} \times \frac{3.375}{0.5} \times \frac{1}{2}\left[\left(\frac{0.5}{3.375}\right)^{0.219} + \left(\frac{0.5}{4.937}\right)^{0.219}\right] = 0.0632$$

Element FH:

$$K \text{ on OA} = 0.64257 \times \left(\frac{1.758}{4.88}\right)^{0.219} \times \frac{1.25}{15.544/4.88} \times \frac{3.375}{4.88} \times \frac{1.16}{1.25} = 0.12936$$

Total on OA = $\overline{0.89840}$

Corrections:

For hot top; 21.3 pct meaning dividing by $\sqrt{\frac{100 - 21.3 \times 0.75}{100 - 21.3}}$, or multiplying by $\frac{1}{1.0267}$

For taper; 3.467 pct the wide faces, with $\frac{L}{C} = 2.78$, or $= \times \frac{100 + 2.78 \times 3.467}{100}$ or $\times$ 1.09638

Increase due to $\frac{L}{C} = 2.5$ average, v. $\frac{L}{C} = 3$, (by fig. 13) $= \times$ 1.0069.

Giving total (K) on $\overline{\text{OA}} = 0.89840 \times \frac{1}{1.0267} \times 1.09638 \times 1.0069 = 0.966$ v. 0.9605, actual or a deviation of + 0.57 pct.

Nelson's examples. Since the locus of the experimental results is practically a straight line from 1 to 5 in., it is reasonable to assume that such a straight line also covers the remainder of solidification.

Then K, as we have used it, can be derived from the Armco equation applied to the end of solidification, which gives: $\overline{OA}$ cold $= \frac{8.028}{1.03} = 7.794$ in.; $7.794 + 0.12 = 7.914$ in.; $7.914 = 0.9\sqrt{T}$; $\sqrt{T} = \frac{7.914}{0.9} = 8.793$; $K = \frac{7.794}{8.793} = 0.8863$, or in the system as used herein, and for end of solidification, $D = 0.8863\sqrt{T}$.

Incidentally, the Armco formula has given rise to the thought that there might be a lag of 1.068 sec in the process of solidification at the beginning, on the evidence that the straight line of fig. 25 crosses the time axis past the zero point. This notion is unnecessary. Plotting Nelson's results for the two 14x20-in. ingots in the same kind of coordinates as fig. 25 would also lead to freezing delays, this time in the wide direction, but to freezing ahead of contact between steel and mold for the narrow direction; in the wide direction freezing is delayed by 1.98 and 0.565 min, and in the narrow direction freezing is ahead of contact by 7 and 0.81 min (see figs. 26 and 27) which is obviously in error. Cooling curves, such as illustrated in figs. 11E and F for the same ingots, are therefore much more logical and cannot lead to such untoward deductions as above. As a consequence, the cooling line of fig. 25 is also a curve and starts practically at zero, as drawn (dotted line). Now one has the very same picture as for the various Nelson examples.

All told, the comparison gives the following relations:

$$\frac{K \text{ for 0.07 C steel}}{K \text{ for 1.00 C steel}} = \frac{0.8863}{0.7804} = 1.1356$$

$$\frac{\text{Freezing time for 1.00 C steel}}{\text{Freezing time for 0.07 C steel}} = 1.1356^2 = 1.2897$$

TABLE V

Calculation of K Values for the Long 14 x 20-in. Ingot

Fig. 23: Area = 15.341 at scale; experimental K on $(\overline{OA}) = 9849$ (fig. 11F).

Similar calculations give:

Element AB — K on $\overline{OA} = 0.4357$
BC — K on $\overline{OA} = 0.07471$
CE — K on $\overline{OA} = 0.22211$
EF — K on $\overline{OA} = 0.062582$
FH — K on $\overline{OA} = 0.11996$
Total K on $\overline{OA} = 0.915062$

Corrections:

For hot top — 16.9 pct $= \times \frac{1}{1.0251}$

For taper = 2.545 pct and $\frac{L}{C} = 3.357 = \times 1.08543$.

For $L/C = 2.8$ average, v. $L/C = 3$ (fig. 13) $= \times 1.0025$

Total $K = 0.915062 \times \frac{1}{1.0251} \times 1.08543 \times 1.0025 = 0.9714$ v. 0.9849 actual, or a deviation of −1.37 pct.

That is, the low C steel would freeze decidedly faster, as appears natural.

Freezing times for steels of various carbon contents—The following treatment of this problem is not quite orthodox, but gives indications which appear plausible. The idea has been to use the data by T. F. Russell[4] on the cooling of various geometrical shapes, from the pouring temperature to the solidus temperature, as estimated for steels of various carbon contents, and thus derive the cooling times, all other conditions being constant. Of course, this assumption is basically wrong since cooling over such a range

TABLE VI

Calculation of Corrected K Value for a 1.00 Carbon Steel

$$\text{AB—}K \text{ on OA} = 0.64257 \times \left(\frac{6.371}{8.028}\right)^{0.219} \times \left(\frac{16.986}{151.6925/8.028}\right) \times \frac{\text{Efficiency}}{1} \times \frac{\text{Transposition}}{1} = 0.54892$$

$$\text{BC—}K \text{ on OA} = 1.3739 \times \left(\frac{6.040}{2.028}\right)^{0.219} \times \left(\frac{\pi}{4} \times \frac{2.028^2}{151.6925}\right) \times \frac{8.028}{2.028} \times \frac{1}{2}\left[\left(\frac{2.028}{8.028}\right)^{0.219} + \left(\frac{2.028}{19.014}\right)^{0.219}\right] = 0.09801$$

$$\text{CE—}K = 0.64257 \times \left(\frac{5.709}{19.014}\right)^{0.219} \times \left(\frac{6}{151.6925/19.014}\right) \times \frac{8.028}{19.014} = 0.15671$$

Total (K) on $\overline{(OA)} = 0.80364$

Corrections:

For $L/C = 2.5$ average v. $L/C = 3$ (fig. 13) $= \times 1.0068$

For taper = 0.8928 pct with $L/C = 3.972 = \times \frac{1}{1.03675}$

Total corrected K value $= .80364 \times 1.0068 \times \frac{1}{1.03675} = 0.7804$, v. 0.8863 actual.

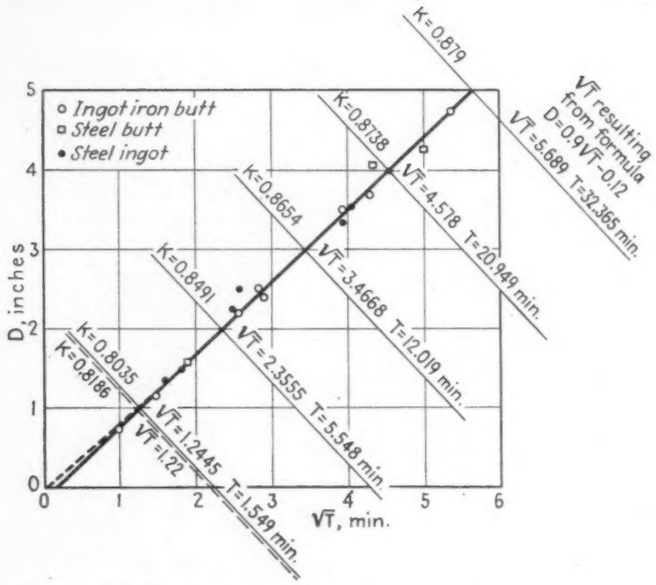

FIG. 25—Relationship between D and $\sqrt{T}$ as determined by Chipman and Fondersmith[3].

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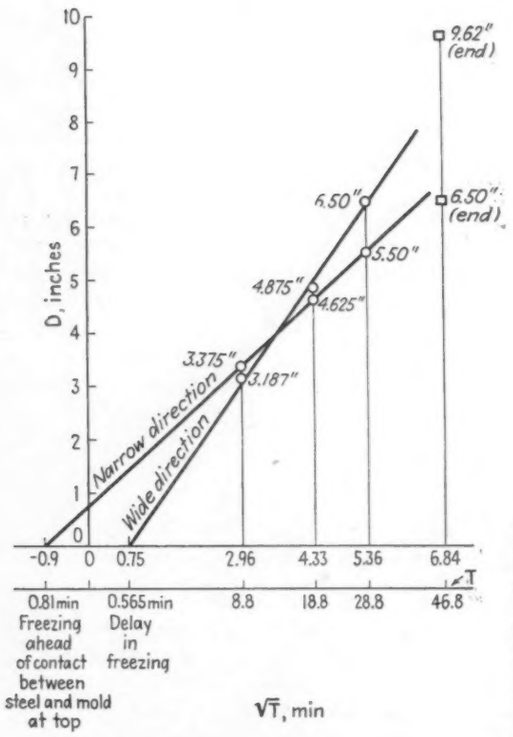

FIG. 27—Relationship between D and $\sqrt{T}$ for a long 14x20-in. ingot.

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BELOW

FIG. 26—Relationship between D and $\sqrt{T}$ for a short 14x20-in. ingot.

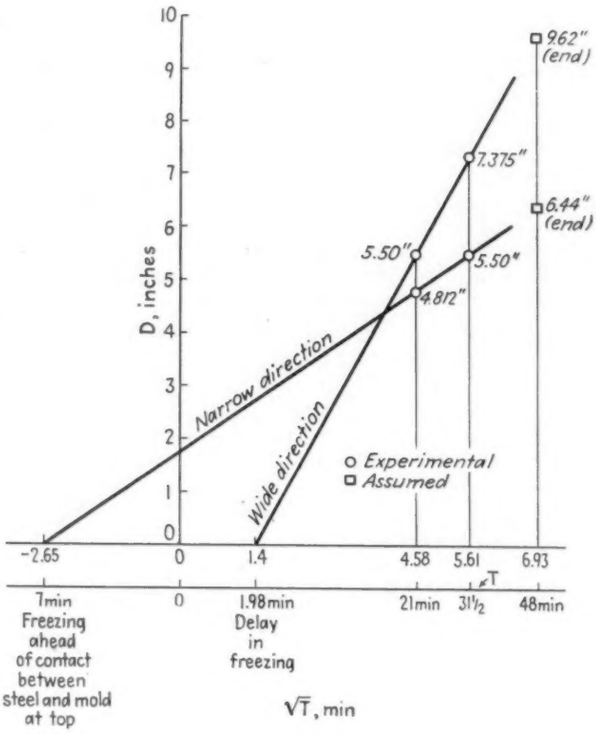

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FIG. 28—Relative freezing times for ordinary steels of various carbon contents.

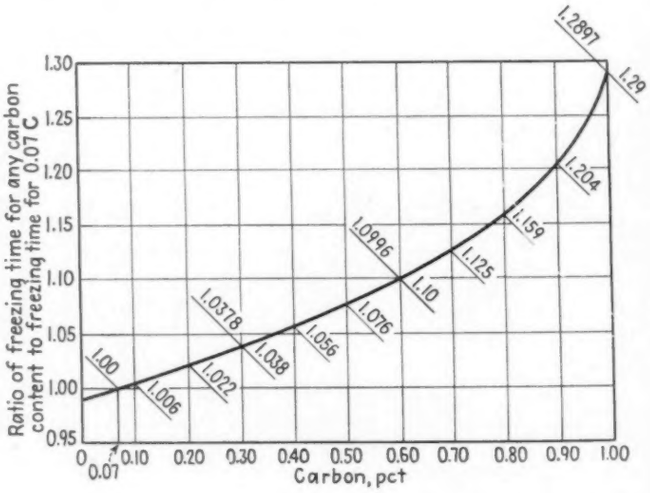


TABLE VIII

Calculation of Freezing Times for Steels of Various Carbon Contents

For carbon content of steel	0.07	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Multiply the freezing time for 0.07 C steel by *	1.00	1.006	1.022	1.038	1.056	1.076	1.10	1.125	1.159	1.204	1.29

* From fig. 28.

involves also liquid and partly solidified steel and that solidification and eventually one or several critical points imply a very important outlet of heat and consequently a very considerable delay in cooling. But precisely the times obtained by the above method should show this delay. Since the conclusion has already been arrived at that 1.00 pct C steel takes 1.2897 times as long to freeze as 0.07 pct C steel, it might be possible to combine the two sets of values to derive some acceptable data for the intermediate carbon contents.

As a start, Nelson made the observation that 1.00 pct C steel poured at about 2775°F was at some 1800°F on the outside of the ingots when their centers had just solidified (that is, had reached a solidus temperature of about 2400°F) This means that at $\frac{X}{L} = 0$ (Russell's notation), the temperature had dropped to $U = \frac{2400}{2775} = 0.865$, and at $\frac{X}{L} = 1$ to $U = \frac{1800}{2775} = 0.64875$. Since Russell's data are given for slabs, but not squares, this means that under one pair of faces, the temperature drop would have been $U = \sqrt{0.865} = 0.930$ at $\frac{X}{L}$ and $U = \sqrt{0.64875} = 0.80545$ at $\frac{X}{L} = 1$.

From this is derived an (HL) value on slab of 0.336, and a τ (time factor) of 0.514565. (HL) covers cooling power, which basically should be kept constant. Aiming at this (HL) value in every case, one can use the square root of the temperature drop (U) from pouring temperature to solidus at $\frac{X}{L} = 0$ for each steel, and thus determine the corresponding (τ) factors. In brief, the following (τ) factors, supposedly proportional to the actual cooling times, were obtained—the assumptions as regards pouring and solidus temperatures are: 0.07 C steel, 2832°F (pouring temperature) and 2696°F (solidus temperature) respectively; 0.30 C steel, 2808°F and 2633°F; 0.60 C steel, 2778°F and 2538°F; 1.00 C steel, 2775°F and 2400°F.

For 0.07 C steel, $\tau = 0.23988$
For 0.30 C steel, $\tau = 0.275702$
For 0.60 C steel, $\tau = 0.33442$
For 1.00 C steel, $\tau = 0.514565$

The extreme times are thus roughly as 1 to 2.1 while by previous results, they should be as 1 to 1.2897. This confirms that there is a considerable delay in excess of the (τ) times, due mainly to progressive solidification. It was then assumed that this delay is constant for all carbon steels, with the idea that delays not very different would not alter the final results sustantially. Then

$$\frac{0.23988 + (x = \text{delay})}{0.514565 + x} = \frac{1}{1.2897}$$

giving $x = 0.70815$ and times ratios as per table VII. These results have been plotted in fig. 28, from which the relative freezing times for any carbon contents can be obtained and are such as listed in table VIII.

Another example of freezing time and K value has been given by V. M. Tageev and B. B. Gulyaev[6]. These authors experimenting with an octagon-fluted ingot approx 32 in. in diam and made of Ni-Cr-Mo steel (carbon and alloys not stated) obtained a final K value of 2.98 in the metric system (40 cm radius of ingot, frozen in 180 min from beginning of pour—or $K = \frac{40}{\sqrt{180}} = \frac{40}{13.416} = 2.98$, thus verifying the relation obtained, which was also derived from theoretical considerations). This value, translated in the inch system, becomes $K = \frac{2.98}{2.54} = 1.1731$.

Calculating the K value by the present method leads to the following:

Reading the drawing at scale, the corrugations are 60 mm deep and the average vector to freeze under the hot tip is 405 + 30 = 435 mm, while

TABLE VII

Ratios of Freezing Time for Steels of Various Carbon Contents

STEEL	Total Time to Freeze	Ratio to Time for 0.07 C Steel
0.07 C	0.23988 0.70815	
	0.94803	1.00
0.30 C	0.275702 0.70815	
	0.983852	1.0378
0.60 C	0.33442 0.70815	
	1.04257	1.0996
1.00 C	0.514565 0.70815	
	1.222715	1.2897

the average wall is 188 — 30 = 158 mm; $Z = \frac{158}{435} = 0.3632$; $Z^{0.219} = .80088$. The corrugations imply a K value multiplied by 1.0731. D cold = $\frac{435 \text{ mm}}{25.4 \times 1.03} = 16.628$ in. K smooth round open top = 1.3739. $Z^{0.219} = 1.3739 \times .80088 = 1.10025$. A taper, 1.19 pct on each side, with $\frac{L}{C} = 1.5848$, implies an increase of $1 + 0.0119 \times 1.5848 = 1.0192$. $\frac{L}{C} = 1.5848$ v. $\frac{L}{C} = 3$ has an increase effect of 1.0323. A hot top, assumed at 15.5 pct has the effect of dividing by $\sqrt{\frac{100 - 15.5 \times 0.75,}{100 - 15.5}}$ or multiplying by $\frac{1}{1.02285}$. The total K value for 1.00 pct C steel is $1.10025 \times 1.0731 \times 1.0192 \times 1.0323 \times \frac{1}{1.02285} = 1.2145$. The freezing time, therefore is $T = \frac{D^2}{K^2} = \frac{\overline{16.628^2}}{\overline{1.2145^2}} = 187.44$ min v. (180 −4) = 176 min from filling of ingot. The ratio $\frac{\text{calculated time}}{\text{actual time}} = \frac{187.44}{176} = 1.0650$ is the relative time due to carbon content lower than 1.00 pct, see chart fig. 28. The ratio $\frac{1.29}{1.055} = 1.213$, indicates an actual carbon content of 0.915.

A hot top of 20 pct, resulting in a multiplication factor of 1.0308 would lead to

$$K = \frac{1.2145 \times 1.02285}{1.0308} = 1.2050$$

$$T = \frac{\overline{16.628}^2}{\overline{1.205}^2} = 190.42$$

$$\frac{T}{TA} = \frac{190.42}{176} = 1.0819$$

relative time due to $C = \frac{1.29}{1.0819} = 1.1922$, pointing to 0.88 C.

There is no way of knowing whether the carbon content thus determined is near the actual percentage. Besides, the alloy content may alter the influence of carbon on the solidus. Then, the only striking fact is that calculations for such a large ingot may lead to a freezing time differing only slightly from the actual time, in any case.

A remark to be made is that the Russian experimenters appear to consider their formula $K_{in.} = 1.1731\ K_{cm} = 2.98$ as applying to the end of solidification for any round ingot, regardless of the mold wall, corrugations, nature of steel, length of ingot, amount of hot top, etc. This does not seem justified. In fact, the two

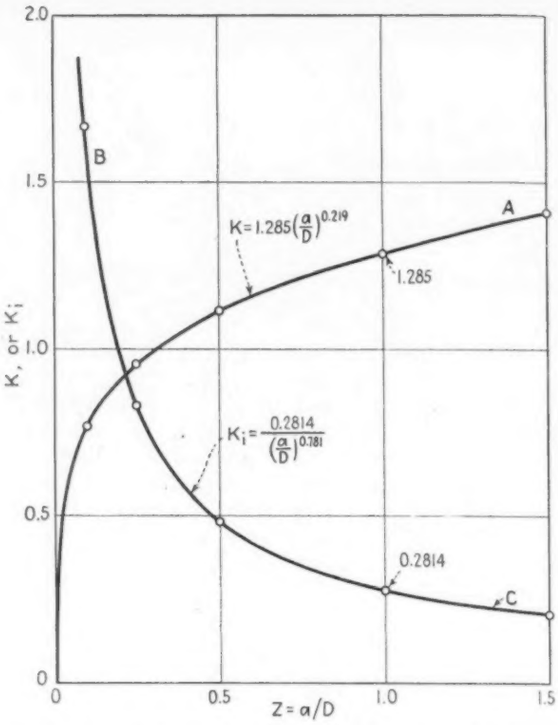


FIG. 29—Relationship between Z $\left(\frac{a}{D}\right)$ and K (and K_1). K is an integration of K_1 varying with $\frac{a}{D}$ as given by equation 18 in the test.

round ingots of Nelson come with K values of 1.09 and 1.21 (also from start of pour) and thus illustrate considerable deviations relative to each other and to the Russian ingot.

Rapid determination of the freezing time for common ingots of the three types—charts, figs. 30 and 31 (see part IV for figs.) have been built to give quickly the approximate solidification time of a representative ingot of one of the three types, that is, especially square and flat ingots having a small common corner radius and flat ingots from molds having a wall slightly lighter on the narrow faces.

An example of this can be found in the previous 18x39-in. Armco ingot having $\frac{W}{t} = 2.37\ D^{\text{cold}} = 7.794$ in., or $t = 15.588$ in., from which is obtained, through fig. 30, a freezing time of 116 min, which has to be corrected through the alignment chart of fig. 31. As shown by the dash line —starting at left with 116 min, an actual (Z) value of 0.7936 on the wide faces, then an average $L/C = 2.5$; no hot top; a product of taper and $\frac{L}{C}$ −0.8928 pct x 3.972 = 3.546 pct; a carbon content of 0.07; lead, at extreme right, to a freezing time of 77 min, v. 77.34 min, as previously calculated ($\sqrt{T} = 8.793$, $T = 77.34$ min).

Concluding this article in a subsequent issue, the author translates his mathematical calculations into practical, down-to-earth observations concerning mold design.—Ed.

Alloy Billet Grinder Features Oscillatory Head Movement

FIG. 1—In this operational photo of the Hamilton slab grinder the wheel is obscured by the stream of water being directed upon it. The foreground shows the conveyer with its pneumatic holding vises. The wheel is at right angles to the long axis of the slabs.

LOWER cost, controlled metal removal and elimination of the human element in grinding are principal features claimed for a new automatic billet grinder designed particularly for stainless steel slabs, billets and similar hot-rolled products. This unit was described by A. E. Hamilton, Jr., vice-president, Hamilton Pump Co., Pittsburgh, in a paper presented at the recent annual meeting of the Assn. of Iron & Steel Engineers at Pittsburgh.

The finishing quality of stainless steels depends largely on its fundamental and successive conditioning, Mr. Hamilton said. He was referring particularly to scale and defect removal on hot-rolled stainless steel products and the required abrading, including both intermediate grinding and final finishing on cold-rolled steel strip and sheet. The billet grinder is covered here; the sheet and strip unit was described in THE IRON AGE, Aug. 14, p. 65.

Only the original, or development model, of the Hamilton slab grinder is now in production. It is being used to grind the flat surfaces of stainless steel slabs up to 30 ft long, 24 in. wide and 4 in. thick. Its job, according to Mr. Hamilton, is to do mechanically and electrically what has previously been done manually. Although operating cost and production cost were only secondarily considered, Mr. Hamilton reported that these are well within economic limits.

The basic part of the machine is the head, normally fitted with a 30x4x12-in. standard snagging wheel. This is driven by a 50-hp double end motor. The wheel assembly is on a swing arm operated by an 8-in. diam air cylinder with controlled pressure. Fine adjustment is obtained by a handwheel. Transverse motion of the head, across the work which moves under it on a conveyer, is achieved by a 5-hp dc motor. This drives through a gear train and is electrically governed by reversing controls with dynamic braking.

Not only does the swing arm move vertically on trunnions, but it also has a radial motion. It transcribes a limited arc on a circular ball race in the center of the main housing. This movement is called oscillatory and lesser vibratory and is transmitted by a link connection from the hypocycloidal gear case driven by another 5-hp dc motor. Its action derives from a hypocycloidal evolution generated by a planetary gear arrangement in the gear case. When this movement is combined with the transverse reciprocation of the head itself and the intermittent travel of the conveyer, it imparts what might be called a superhypocycloidal evolution of pattern that never repeats itself.

The purpose of this action is to stimulate the motions of the human shoulder. Aside from elimination of the human factor, the mechanical oscillatory movement permits deep snagging and metal removal when required. It is also intended to keep abrasive grain constantly sharpened and thus prevent wheel loading.

All grinding is done under water applied at controlled pressure and volume directly onto the face of the wheel. This smothers and collects dust and cuttings, prolongs wheel life, and keeps the steel cool during grinding. The latter reduces the distortion tendency of 18-8 steel and is said to prevent the heat of dry grinding from opening checks or cracks in straight chromium stainless steel.

Greater wheel economy is also claimed for the Hamilton slab grinder. The water and the oscillating motion keep the wheel clean even when it is working under pressures of from 300 to 500 lb. These wheel pressures are pneumatically applied and are controlled by a hand regulator and a gage. Production experience shows a ratio of metal removal to abrasive loss of 8.65 to 1. Discussing the cost factor, Mr. Hamilton said that

if 2½ pct metal removal were required, abrasive costs would be about 5¢ per lb of metal removed. Another advantage claimed over manual operation is the resiliency of the pneumatic cylinder which overcomes the tendency to grind off too much of some high spots while missing others. Wheel bouncing, which usually causes impregnated abrasive grain, is similarly said to be eliminated.

An ammeter recorder chart makes a continuous record of the machine's operation through the action of the grinding wheel. The chart is graduated vertically by ampere load on the wheel and horizontally by minutes and hours. The chart gives the operational foreman contact time, down time, power consumption, etc., and can be used as a record of tons conditioned, metal removed and similar data. A chart taken from a typical slab grinding operation showed that on eight surfaces of two double-slab setups the actual contact time was 215 min while complete running time, including noncontact time for loading and turning slabs, was 239 min. This was equivalent to 0.74 hr per ton, against 3 hr usually required for manual grinding. A number of improvements are said to be under way in the grinder, the principal one being a mechanical change designed to at least double its speed and reduce grinding time to less than ½ hr per ton.

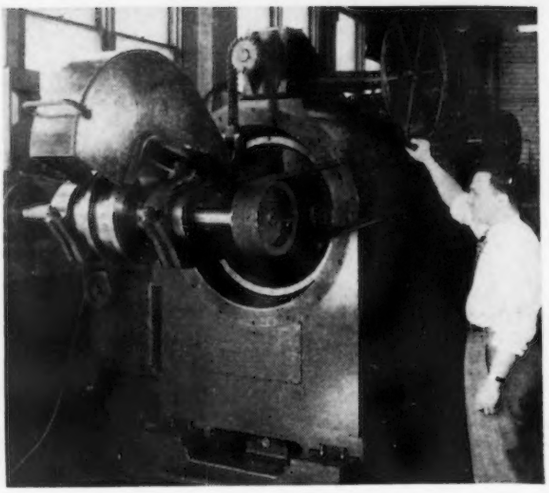


FIG. 2—Close-up of the heart of the machine, showing, in the foreground, with but one set of drive belts attached, the shaft that drives the grinding wheel. The wheel hood cover, raised, is in the center, showing the wheel mounting flange.

A Nondestructive Spot Weld Test for Stainless Steels

A NON-DESTRUCTIVE, quick and reliable inspection technique for spot welds in austenitic steel sheets, developed by the Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, England, is described by A. M. Armour in the September issue of *Metallurgia*. Examination of many test welds with different machine settings so as to give welds ranging from very good to very poor showed conclusively that the better the weld, the greater the change in magnetic permeability at the spots, according to the report. The permeability was always increased by welding and this change was appreciable in good welds and very small in bad welds.

Thus it was established that a quickly obtained magnetic criterion of the weld-spot thermal history could be relied upon to check with pull tests and radiographic tests, but the method of applying this magnet test called for considerable skill. A magnetic detector was required capable of responding to small local changes in permeability while being simple to apply to welds in difficult situations. The Metroflux captive-fluid magnetic detector cell (British Patent No. 439-324) developed by Metropolitan-Vickers Research Dept. provided the simplicity, sensitivity and flexibility needed, the report states.

This cell consists of a transparent plastic molding, which can be of any convenient size or shape, in the form of a shallow dish with a thin diaphragm forming a back that is usually opaque and white. The cell is sealed off and contains a small quantity of black magnetic fluid made up of minute magnetized particles suspended in a light oil. If the detector is well shaken so as to disperse the magnetic particles through the oil and is laid down on the magnetized sheet face containing a spot weld, the magnetic particles will swim to the magnetic spot and reveal it as a particle pattern on the white diaphragm. This will only occur if the magnetic properties at the spot differ from those of the parent sheet. Thus the detector only shows up those spots that have reached a high enough temperature during welding to produce satisfactory welds.

As a result of extensive use of the magnetic method of spot-weld examination, two types of particle pattern have become known. These depend upon the direction in which the external magnetization is made to traverse the spots. In the *black spot* technique the flux from the exciting magnet is made to flow axially up the spot, normal to the sheet surface and into the detector cell. The more permeable spots tend to act as magnetic extensions to the exciting magnet and so draw the particles to them in dark clusters, as contrasted to the lighter concentrations associated with the less magnetic parent sheet. In this way, black spots are seen against the white background of the detector cell. In the *white spot* technique, the flux is made to flow diametrically across the spot, parallel to the sheet and the bottom of the detector cell. The magnetic particles then tend to accumulate at the entry and exit arcs of he spot circles leaving a lighter space between the dark brackets so formed. Though either method can be used, the *black spot* is preferred since there is no likelihood of a bursting bubble in the detector cell being mistaken for a white spot, as may occur when using the *white spot* technique.

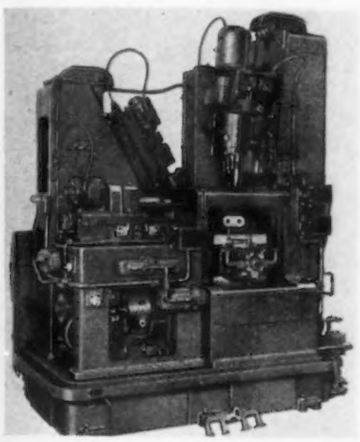
This method of insuring the soundness of spot welds is quick, simple and reliable, and dexterity is soon acquired, the report asserts. It is not necessary for the magnetization to be close to the material. If of sufficient power, it can be an inch or two away. Faulty spots can be marked, rewelded and then retested. Most ferrous stainless alloys can be tested by this method, it is stated.

New Equipment . . .

A special automatic for machining manifolds, hydraulic grinding and boring machines, a die sinker, projection welders, variable speed transmissions, displacement pumps, carbide cutters and grooving tools are reviewed herein, together with electronic measuring equipment, a metal comparator, gas detectors, weld cleaning tools, a die truck, and cutting oils.

Special Automatic Machine

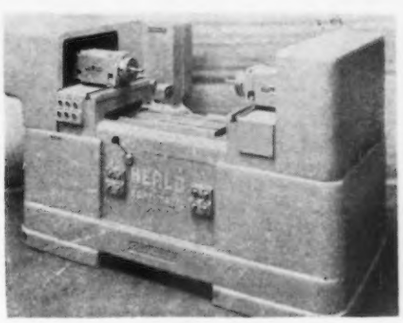
DRILLING, spotfacing, chamfering, combination drilling and tapping operations on cast iron intake manifolds are performed in a new special automatic machine produced by *Snyder Tool & Engineering Co.*, 3400 E. Lafayette, Detroit



7. High-speed steel tools are employed, operating in special hydraulic units, powered with individual electric motors of requisite size for each station. Work-cycle consists of load, index, rapid approach, feed and rapid return, all with the exception of loading performed in a completely automatic cycle. Hydraulic work units are mounted on an automatic Geneva index table with four stations. Parts are clamped manually.

Grinding and Boring Machines

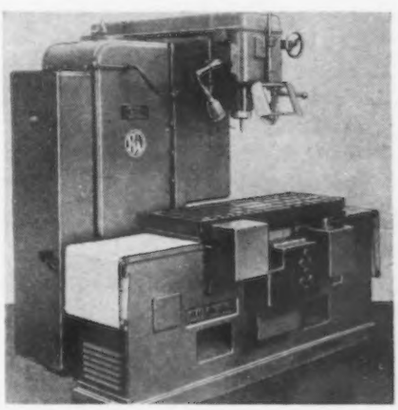
HYDRAULIC grinding and boring machines introduced by *Heald Machine Co.*, Worcester 6, Mass., feature operation independent of oil temperature to insure maximum output without depending on the attention of the operator in adjusting feeds. Motors and pumps are mounted off the machine to avoid vibration and keep warm oil out of contact with the base. Improved idlers, cylinders, automatic way lubrication and refinements in hydraulics are said to result in smooth table motion. Wheelheads, workheads and boringheads are permanently lubricated. Other features include improved ring type cylinders, steel piping with flare fittings, valves mounted on plates and removable without disturbing pipes, and self-adjusting brakes. All new Bore-Matics are equipped for two-way boring with different feeds in the two directions, being capable of both rough and finish boring, turning, facing, chamfering, grooving or fly cutting. They can be arranged with hand operated or fully automatic fixtures. The grinders are



designed for high production precision grinding of small to medium-large holes, furnished in both Gage-matic and Size-matic models.

Die Sinker

DEVELOPMENT of the No. 4D die sinker, which produces original forging dies, diecasting dies, molds and similar work has been announced by *Pratt & Whitney, Div. Niles-Bement-Pond Co.*, West Hartford, Conn. All machine motions are power-operated, with speeds and feeds infinitely variable, but with all motions under pilot hand control. The three fundamental machine motions necessary for die sinking are provided through a longitudinally moving horizontal work table of fixed height, and a vertical slide carrying a transverse (cutter spindle) slide. Movements of these slides are governed by the new Directron control which permits compounding any two components of travel. This control is a single-lever device which controls



automatic continuous compound movements in any direction in either a horizontal or vertical plane. Spindle speeds are variable between 35 and 1750 rpm. The spindle itself has a collet closer of the wrenchless type to facilitate quick cutter change. Machine operates on standard ac voltages. Approximately 4½ hp is required. Table working surface is 16 x 43 in.

Machine Tool Transformers

MACHINE tool transformers having ten ratings ranging in size from 0.075 to 3 kva for use on 60 cycle circuits of either 220 or 440 v have been produced by *General Electric Co.*, Schenectady 5. For 25-cycle applications these transformers are listed in four standard sizes ranging from 0.150 to 0.500 kva, having primary voltage taps for 220, 440, and 550 v. An all-purpose group rated for both 50 and 60 cycle supply circuits is provided, to complete the line. The

primary is equipped with 8 voltage taps ranging from 208 to 550 v. They have standard 110-v secondaries with 92-v taps for operation of 60 cycle relays on 50 cycle circuits. Design of the transformers provides control panel mounting of practical built-in auxiliaries. The unit has an overload protector with time delay action.

Fractional HP Motor

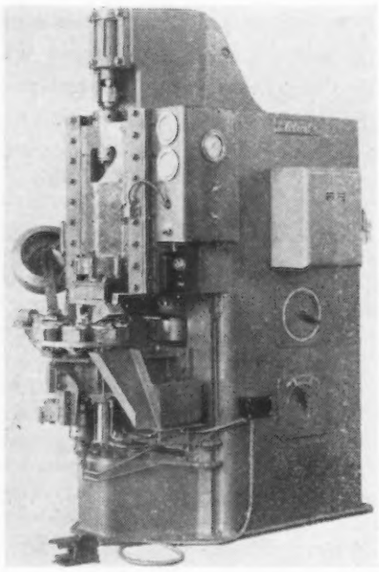
INTRODUCED as an addition to the line of motors manufactured by *Redmond Co., Inc.*, Owosso, Mich., a new unit built in sizes up to 1/15 hp is recommended for fan duty applications. It is referred to as type W and is of ventilated four-pole shaded pole design for ac operation and is non-radio-interfering. The motor was engineered particularly for use on products such as air circulators, unit coolers, evaporative coolers, exhaust and pedestal fans, and air conditioners. A large-capacity lubricating system circulates oil through porous bronze bearings. The motor operates at 1500 rpm on 115 v, 60 cycle current. Overall housing length is 5⅛ in. and diameter is 3 15/16 in.

Variable Speed Transmission

THE Model T-1 hydraulic variable speed transmission offered by *Portman Machine Tool Co.*, New Rochelle, N. Y., is a self-contained unit said to be suited for all applications in the lower power ranges up to and including 1 hp. Infinitely variable speeds are available from zero to full motor speed of 1200 rpm, forward and reverse. Maximum torque of output is 52.5 lb-in. at all speeds. Special controls other than the standard handwheel include manual through levers, flexible shafts, chains, and sprockets. Automatic and remote types by means of hydraulic and electrical devices may be designed for special applications.

Projection Welder

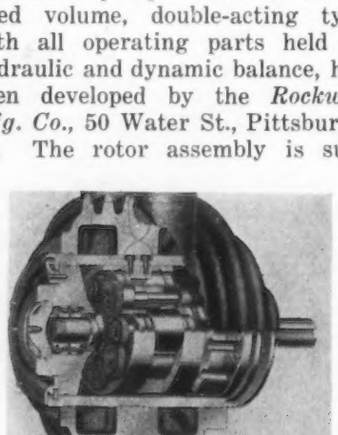
DESIGNATED as the PH4-12 hydraulic projection welder, a high production welder for welding gasoline engine push rod assemblies at the rate of 1200 per hr is announced by *Federal Machine & Welder Co.*, Warren, Ohio. The hydraulically-operated, eight-station automatic dial feed table is equipped with positive indexing and locking devices. Eight welding fixtures consist of solid type, copper alloy dies with insulated locators for positioning the disks for any of the various size tappet assemblies which the machine is



capable of welding. Dies are designed for quick changeover from one size to another. The machine is also equipped with an automatic hopper feed, and a 400 kva welding transformer, having water-cooled, cast copper secondaries wound for 380-v, 60-cycle ac and is provided with 16-point series parallel heat regulation.

Positive Displacement Pump

A ROTARY, positive displacement pump which is of the fixed volume, double-acting type with all operating parts held in hydraulic and dynamic balance, has been developed by the *Rockwell Mfg. Co.*, 50 Water St., Pittsburgh 22. The rotor assembly is sus-



pended within the pump body on a horizontal drive shaft that turns in anti-friction bearing mounts. The rotor carries four, half-moon shaped impeller vanes equally spaced on its outer circumference and geared together in the ratio of 2 to 1. As the rotor is turned by applied torque, the position of these vanes varies with respect to the sidewalls of the circular pumping structure so that each pair of diametrically opposed vanes forms two closed compartments per rotating cycle. These rotocyle pumps are said to run equally well in either direction. A volumetric efficiency of 90-95 pct is claimed with overall operating efficiencies of between 85 and 90 pct, depending on the fluid handled and the working pressure.

Transmission Belting

PRODUCTION of four brands of transmission belting, Monarch Amber, Neoprene, Sagamore and Ajax, has been announced by Hewitt Div., *Hewitt-Robins, Inc.*, Buffalo 5. Monarch Amber is of straight-edge construction, flexible, built in medium grades of extra strength hard silver duck. All plies are insulated with pure gum rubber compound. It is recommended for heavy-duty drives. Also suitable for heavy-duty operations is the Sagamore belt which is made of pre-stretched hard silver duck plies, frictioned and skimmed with pure rubber compounds. It is made in the folded edge construction. Neoprene is of the same general construction as Amber except that Neoprene is used rather than natural rubber. Ajax is a folded-edge belt, recommended for medium-duty transmission service. Belts are made endless by a special drum-splice method and are available in 500 to 550-ft rolls.

Carbide Milling Cutters

A LINE of improved shell, face and end mills has been developed by *W. T. Howald Machine Works*, 182 Sigourney St., Brooklyn 31, featuring carbide tipped blades having square shanks, held in the bodies of the cutters by means of a new locking method. Blades of the shell and face mills are simple square shank tools having no serrations, grooves or other limiting elements. Fine adjustments of the blades are said to simplify regrinding.

Carbide Grooving Tool

A CARBIDE tool designed for production grooving A, B, and C belt size pulleys, has been marketed by *Wendt-Sonis Co.*, Hannibal, Mo. Standard tools are furnished with proper grade of carbide inserts for material to be machined. Nose widths and angles

are held to close tolerances for accurate production of the finished pulley, the company states. Shanks are hardened and treated to prevent rusting. Carbide tips are covered with plastic to prevent chipping from handling. These grooving tools are manufactured in shank sizes ranging from ⅝ x 1 in. to 1-in. sq.

Electronic Measuring Equipment

ELECTRONIC measuring equipment announced by *Brown & Sharpe Mfg. Co.*, Providence 1, includes an amplifier, No. 950, featuring simplified setting with accurate linear graduations for accurate measuring. This amplifier permits settings from 0.0001 to 0.00001 in. and, as it is a separate unit, the heat generating equipment contained in it is apart from

the actual measuring apparatus, preventing temperature drift troubles. An external comparator, No. 951, illustrated, has a range of 0 to 4 in. and measures by 0.0001 to 0.00001 in. The setting of this instrument requires one master; the anvil is reversible and, in addition to its regular surface, provides also a narrow surface for small parts or work of irregular shape. An internal comparator attachment, No. 952, used with the No. 951, is inserted in the external comparator in place of the anvil. By means of interchangeable plugs, measurements can be made by 0.0001 to 0.00001 in. over a range of ½ to 2 in. Gage head cartridge, No. 953, also a part of this electronic measuring equipment, is designed for application in a variety of installations for jigs, fixtures, gages and inspection devices. A signal light attachment, No. 958, is provided for use with amplifier No. 950 to provide colored signal lights.

Metals Comparator

FOR providing a non-destructive comparison of either magnetic or nonmagnetic metal parts with a standard, *General Electric Co.*, Schenectady 5, N. Y., has introduced an electronic metals comparator. Parts appearing alike but differing in composition may be separated with the instrument, it is stated, differentiating between annealed and unannealed steel bars, and also sorting finished metal parts with different compositions or heat treatments. The metals comparator employs a balancing network and indicating instrument mounted on a steel cabinet to which is connected an external test coil. In operation, a reference specimen for the group of specimens being compared is first placed in the test coil and adjustment made to secure the initial balance. The specimen is then removed and the parts to be tested are inserted briefly in the coil, one by one. When tolerances have been established, specimens may be accepted or rejected on the basis of the dial reading. It is claimed as many as 1500 small parts can be tested in one hour.

Fuse Puller Switches

A REDESIGNED line of fuse puller switches, rated at 60 amp, 125/250 v, ac, and measuring 9⅛ in. wide by 14 in. high by 3⅞ in. deep, has been announced by *Trumbull Electric Mfg. Co.*, Plainville, Conn. Four different units are available; two contain four branch circuits, one main, one range circuit and one water heater connection and two units contain six branch circuits, one main, one range circuit and one water heater connection. Units are wired in series or parallel. Solderless lugs are provided for wires ranging from No. 14 to 4. Off and on positions are indicated on the fuse caps. Switches feature self-wiping, snap action contacts.

Permanent Magnet Assemblies

A LINE of standard Alnico permanent magnet holding assemblies consisting of five types in 17 sizes ranging from a pull of 1½ to 500 lb, has been announced by *General Electric Co.*, Pittsfield, Mass. The designs are vacuum impregnated to prevent moisture penetration and a consequent internal rusting and cadmium plated to prevent external corrosion. The line features both the close flux and the deep flux type permanent magnet holding assemblies. The former is available in the cup, cup-stem, and the horseshoe types which are designed for applications where the holding force is through a zero air gap and an extended magnetic field is not required. The deep flux type is produced in the magnetic retriever and magnetic stand models which possess a magnetic field extending to a greater depth than the close flux type.

Gas Detector

FOR determination of hazardous conditions due to the presence of combustible or explosive concentrations of flammable gases or vapors, the *Davis Emergency*

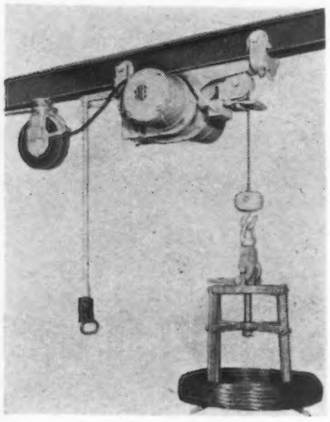
Equipment Co., Inc., 45 Halleck St., Newark 4, N. J., has introduced a gas detection and alarm device known as the supersensitive Vapotester. This model is a two-range instrument that is said to increase the sensitivity tenfold over previous models. One range analyzes combustible gases in terms of their lower explosive limit and a second scale indicates gases in their toxic range. The two filaments, as two legs of a balanced Wheatstone Bridge circuit, are housed in a single cell block having two chambers. The comparison filament is sealed in its chamber and the analyzing filament is housed in an open chamber that permits air or gas to be drawn through it. On the face of the instrument, known as Model 6, is a three-position switch; one position for the combustible range, one for checking the voltage and the third position to increase the sensitivity of the first scale ten times.

Aluminum Flux

AVAILABILITY of a new flux which is said to have particular value for joining aluminum with dissimilar ferrous and nonferrous metals at very low working temperatures has been announced by *All-State Welding Alloys Co., Inc.*, 96 West Post Rd., White Plains, N. Y. Used in conjunction with No. 39 aluminum solder, the high capillary action of the flux makes the solder flow rapidly throughout the fluxed portion of the work. It is available in thin paste form. This flux is known as All-State No. 39 flux.

Electric Hoist

A SPECIALIZED electric cable hoist has been developed by *Yale & Towne*, 4527 Tacony St., Philadelphia 24, for wire stripping in the steel mill, but has usefulness in other fields where the use of a stiff arm for manual spotting to close tolerance is important. The



stiff arm makes it possible to move the hoist to exact locations without the use of a trolley motor. The hoist is offered in 500, 750, 1000 and 1500-lb capacities. Various lifting speeds and lifting heights are available and the equipment requires only 15¼ in. headroom. Hoisting and lowering is by push button control from the end of the stiff arm.

Power-Driven Hand Truck

ANNOUNCEMENT of the Mototruk, a power-driven hand truck, has been made by *Comet Mfg. Co.*, 9253 Nicollet Ave., Minneapolis. It is built along identical lines of a conventional two-wheeled hand truck, but with sturdier construction to accommodate heavier loads. It has the additional advantage of a power-driven unit, providing power to spare for trucking loads up to 1500 lb and is said to move full capacity loads up steep inclines and over obstacles without undue strain to the operator.

Die Truck

A HEAVY duty die truck has been announced by *Palmer-Shile Co.*, 16005 Fullerton Ave., Detroit 27, which has been designed for high production shops and factories where heavy dies, stampings, forgings, jigs or fixtures are continually moved from

one location to another. Roller conveyers can be put on the bed of the truck to facilitate materials handling. Constructed of heavy, special fabricated steel plate securely welded throughout, each truck features a fifth wheel or caster type construction. Wheels are rubber-tired or metal. The truck illustrated is rated at 8 tons.

Cutting Oils

CONTAINING a polar compound of petroleum origin called Petrofac, a new series of Sunicut cutting oils has been announced by *Sun Oil Co.*, Philadelphia 3. Petrofac in combination with other ingredients of Sunicut grades is said to impart unusual metal-wetting, chip antiweld and extreme pressure characteristics to the all-petroleum metalworking compounds in the series. Sunicut 11 is a sulfurized cutting oil which is clear, transparent, free-flowing oil said to permit easy, accurate measurement of the work and observation of the cutting action of the tools. It has high lubricating and cooling properties. No. 105 is a heavy duty transparent sulfurized oil recommended for machining alloy steels where the cuts are heavy and when superior surface finishes are desired. Sunicut 209, a transparent non-emulsifying cutting oil recommended for machining both ferrous and nonferrous metals, is a dual-purpose oil which may be used as a cutting oil and as a lubricating oil. Sunicut 973 is a low viscosity transparent non-emulsifying cutting oil for machining aluminum and magnesium, suitable for high production screw machine operations.

Weld Cleaning Tool

KNOWN as the Multi-Pic, a weld cleaning hammer developed by *Bernard Welding Equipment Co.*, 741-43 E. 71st St., Chicago, is said to work on an entirely new principle. Five separate pick-pointed hammer heads, each free to slide ⅜ in., are mounted on a single hammer handle. When a blow is struck, each of the five head segments strikes with equal impact at five different points, regardless of surface contour. These free-sliding head segments actually wrap the force of a blow around a convex weld bead, follow the contour of a concave weld fillet or the irregular surface of the hard-to-reach crevices such as are found in weld bead

craters and deep groove multi-pass welds. The head segments are of tool steel, hardened and tempered throughout.

Rock Drill

BUILT for general utility and plant maintenance work, a rock drill, designated as the J-10 Utility Jackhamer, has been announced by *Ingersoll-Rand Co.*, Phillipsburg, N. J. Its lightweight and ease of handling make it ideal for use on a ladder or scaffold, and it is well suited to overhead work, it is said. It has strong automatic rotation and uses standard Jackbits. By using adapters, star drills can be used to drill holes 1⅛ in. and under. A built-in oil reservoir, in the handle, supplies lubrication.

for HIGH STRENGTH

at low temperatures

REVERE COPPER and COPPER ALLOYS

● Revere Copper and copper-base alloys are a "natural" when dealing with applications involving subnormal temperatures all the way down to liquid oxygen (-306°F.) and below.

Copper and its alloys possess the valuable characteristics of becoming increasingly stronger, the lower the temperature, *with no attendant loss of ductility,* and *with no tendency toward brittleness or "notch-impact" sensitivity.*

For example, note the rise in strength, ductility *and* resistance to impact for two copper and brass alloys:

Alloy	Temp. °F.	Tensile Strength, p.s.i.	Elongation % in 2 in.	Impact Resistance, Kg-m per sq. cm.
Electrolytic				
Tough Pitch	68	58,700	8.4	6.6
Copper (Cold Rolled Strip)	-295	64,800	11.2	7.4
Yellow Brass	73	85,400	6.3	8.1
(Cold Rolled Strip)	-295	102,900	10.1	9.4

Other Revere Alloys, such as Herculoy (High-Silicon Bronze, A), show similar improvement in these important mechanical properties.

If you make or are contemplating the manufacture of liquid oxygen equipment, you will be playing safe to specify copper-base alloys. Get in touch with Revere for full information on the low-temperature physical characteristics of Revere metals.

. . .

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y.

Sales Offices in Principal Cities. Distributors Everywhere.

Assembly Line . . .

WALTER G. PATTON

• New postwar Hudson wins enthusiastic approval at private showing . . . Unit type frame construction will be an outstanding feature . . . New Ford is due in the spring of 1948.

DETROIT—Hudson distributors, employees and suppliers and members of the press had a chance to see the new Hudson this week and what they saw was an eye-opener, particularly to those who may have felt that Hudson had fallen pretty well back of some of its competition from a standpoint of styling and engineering.

While the majority of car producers have yet to show their postwar cars it is a reasonably safe prediction that few of the new models are likely to obtain more unqualified approval than the new Hudson got from those who attended the off-the-record showing.

Specifications for the car will not be given out until all Hudson dealers have had a chance to see the new model. The first public showing is scheduled for December. Meanwhile, Hudson has released a photograph of the new model (see below) which makes it possible to discuss in general terms some of the outstanding features of the new car.

Particularly when viewed from the front, the low silhouette of the car is the dominant characteristic. Fenders have been blended into the body in a manner that is rapidly being established in the industry as a style trend. Bumpers are simple in design and are the wrap-around type, both front and rear. A type of door hardware that is new to the automotive industry has been used.

As predicted in THE IRON AGE (Oct. 2, p. 128) Hudson's new frame construction has several points of similarity with the Nash unit-type body construction, although the new design worked out by Hudson engineers has many features that are not available in any other car. One outstanding feature of the Hudson box steel foundation frame is that it offers girder protection at the front, sides and rear of the car.

In the Hudson design the "Monobilt" body and frame are welded into a solid structure comprising the floor, roof and side panels. The "step-down" feature of the new Hudson will undoubtedly be a much talked about innovation. By utilizing this type of construction, Hudson engineers say they have been able to provide more head-room than any other mass produced car as well as a very low center of gravity.

THE front section of the new frame will be supplied by Hudson's present source. The remainder of the frame is being fabricated in a new department Hudson has recently set up to perform this operation. It is reported that one of the major investments Hudson has made in tooling for the new car was the extensive number of jigs, fixtures and welding equipment that are required to produce the box steel foundation for the new model.

Hudson engineers appear to have built unusual rigidity into the new frame. Extensive reinforcements are used and it is believed that a large share of the increased steel requirements of the new car may be attributed to the new frame construction.

An embossed aluminum doorstep will be used. Except for a broad strip along the sides of the car, chromium body trim has been kept to a minimum.

The styling feature of the new model that immediately attracts attention is the curved glass windshield and rear window. Some estimates place the cost of the curved windshield at from three to four times that of flat glass.

Hudson engineers have developed a design that completely cradles the passengers between the axles, with the rear seat passengers sitting not only ahead of the rear axle, but completely ahead of the rear wheel. It is predicted that this arrangement plus the low center of gravity of the car will result in fine riding qualities for the new model.

An aluminum cylinder head and chromium plated wheel trim will be offered as optional equipment, it is reported.

Prices for the new models have not been announced.

ALTHOUGH the new frame construction, curved windshield and new interior trim undoubtedly add up to higher costs, Hudson engineers predicted that it may eventually be possible to build the new body and frame at less than the cost of the old construction. To the writer this appeared to be a most ambitious goal, particularly since the new frame weighs more and appears to require more fabrication than the present mass-produced frame.

Because of the apparent advantages of the new type of frame construction both from a standpoint of design, low center of gravity and added roominess in the car, there has been considerable speculation here as to whether or not any of the Big Three will follow the Hudson lead with regard to frame construction in their postwar models.

There can be little doubt that the change in the assembly line technique, the new jigs and fixtures and welding equipment have been a major item in Hudson's retooling program. In the case of a larger producer such a change might run into many millions of dollars. As yet there are no positive indications that the Big Three are ready to take the same plunge although it has been freely pre-

LITTLE WONDER SPECTATORS ASKED

"Is the Needle Stuck?"

This is Herman Engstrom, one of P&W's top precision experts, demonstrating the accuracy of a Pratt & Whitney Jig Borer quill.

We moved Herman and his equipment right out of our shop into our booth in Chicago, so folks could see exactly what we mean by Pratt & Whitney Precision.

That ELECTROLIMIT Height Gage he is using will split "tenths." As he checked quills with it, there was hardly a flicker of the needle. Many a spectator asked if it was stuck! It wasn't!

That's typical P&W Jig Borer Precision — the kind that goes into the machine, and the kind that comes out. Boring jigs to "tenths" is routine for any P&W Jig Borer. Toolrooms all over the country have found new ways to cut costs and save time with this machine. Pratt & Whitney engineers can show you how.

If precision boring is a part of your picture, write TODAY for literature telling "the hole story."

Introduced for the first time in Chicago was the new P&W All-Electric Jig Grinder, which combines Jig Borer precision-locating with precision hole-grinding. This brand new machine is destined to make toolroom history. We will gladly send you complete literature.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT

dicted here for the past several years that unit type body construction would undoubtedly find increasing favor with automobile engineers.

Hudson's position as an independent producer in the industry should show marked improvement when its new model reaches the motoring public. What remains to be proved is whether or not the timing of the introduction has been favorable. If the projected improvement in the steel supply situation, for instance, happens to follow Hudson's rising production curve, some sources here are willing to predict that Hudson will get off to one of the best starts in the postwar auto race. Whether Hudson will be able to hold an improved position in the industry will depend, of course, on the results of its present plant rebuilding program, how it measures up to its competition and the skill of Hudson's sales department in keeping pace with future market developments.

There was additional new model news in Detroit this week. Ford has announced that after Nov. 1, Ford cars will be identified as 1948 models and the new "from-the-ground up" model will make its debut next spring.

New Transmission To Be Introduced

Detroit

• • • **Buick's new automatic transmission will be introduced in January 1948 according to a recent official announcement.**

Described as "Buick's answer to no-shift clutchless drive," the new transmission is said to be based upon a development utilized in the "Hellcat" tank destroyers built by Buick during the war. The tank transmission was of the torque-convertor type.

Informed sources believe that the tooling program for the new transmission is already well advanced and a number of machines have already been delivered to the Flint plant, it is reported.

The new transmission will be initially introduced on the Roadmaster models only.

MEANWHILE, parts for the new Lincoln and Mercury models are already being delivered. If these models are introduced ahead of the new Ford, as expected, their introduction might come as early as February. Most sources here have assumed that late May would be the earliest possible date of introduction for the new Ford. It now appears that the new models may come off the Rouge assembly lines at a somewhat earlier date.

GM also spoke up on new models this week when C. E. Wilson, president, confirmed the report that only the Cadillac and the 98 series Oldsmobile will be radically new 1948 models. Buick and other GM lines will only be "face-lifted" models, he said. Mr. Wilson indicated that the introduction date for the all-new GM cars would be in the spring of 1948. He also expressed the hope that the prices of new models would not be more than "nothing to 5 pct" above present price levels.

•

Kaiser-Frazer Earnings

Detroit

• • • **Kaiser-Frazer Corp.,** Willow Run, Mich., has reported a net profit of $8,277,308 for the third quarter of this year. Earnings are equal to $1.74 per share.

Kaiser-Frazer had previously announced a loss of $2,188,038 during the first 6 months of 1947.

The corporation's working capital, listed as $12,287,341 as of Dec. 31, 1946, has been increased to $23,518,297 as of Sept. 30, it was reported.

Automobile Industry Appears Headed For Production Records

Detroit

• • • **Despite frequent** newspaper headlines that the steel shortage is seriously throttling automobile production, the automobile industry is going to achieve some remarkable production records during 1947.

In the current issue of *Automobile Facts*, published by the Automobile Manufacturers Assn., these accomplishments have been noted:

1. In the first 9 months of 1947 the auto industry produced more cars and trucks than were built during the entire 12 months of 1946.

2. Replacement parts production is at an all-time high, being almost double last year's output which was also a record year. (C. E. Wilson recently indicated that the money being paid by the motoring public for replacement parts which are made largely out of steel would be equivalent to somewhere between 750,000 and a million new cars.)

3. Employment has reached 789,000 or nearly 40 pct above prewar levels and payrolls are approximately double the 1941 average.

4. If production in October and November continues at its present rate assemblies of cars and trucks will total 4,700,000 units which would be the third highest for any civilian year. (A GM spokesman recently estimated that a 5 million vehicle year is still a possibility.)

At a recent press conference, C. E. Wilson estimated 1947 truck production at 1,400,000 units, adding that at no other time in the history of the industry has new truck production exceeded a million units.

Looking ahead to 1948, Mr. Wilson saw the possibility of an increase on the order of 10 pct in total vehicles produced in U. S. and Canadian plants which would establish an all-time high for the industry. These estimates were qualified by the assumption that there would be no important work stoppages in the coal or the steel industries and that the amount of steel required for the Marshall Plan or any similar help to European countries won't be important enough to cut deeply into the steel supply available in this country.

Mr. Wilson predicted that the coal and steel supply in this country are going to be corrected. A number of steel mills have new facilities that are coming into production this year, he said, and all the new facilities should be in production by the end of next year.

This is no idle promise. It is a proved fact, demonstrated day after day in the production of widely varied parts and products. Three tons of N-A-X HIGH-TENSILE are yielding as many finished units as were previously yielded by *four* tons of carbon sheet steel.

This "new arithmetic in steel" is helping overcome steel shortages for scores of manufacturers. They are taking advantage of N-A-X HIGH-TENSILE'S greater strength and corrosion-resistance to reduce sections an average of 25%—and still provide greater strength and durability than can be obtained with thicker sections of mild-carbon steel.

At a time when America must make fullest use of its steel-producing capacities and conserve its natural resources, the trend to N-A-X HIGH-TENSILE has national significance. Each ton produced represents a potential 33% increase in finished goods. Each ton used enables the manufacturer to get 33% greater usefulness out of his steel supply.

Investigate the opportunity to make each ton of sheet steel go farther—through the superior quality of N-A-X HIGH-TENSILE.

GREAT LAKES STEEL CORPORATION

N-A-X ALLOY DIVISION, DETROIT 18, MICHIGAN • UNIT OF NATIONAL STEEL CORPORATION

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West Coast . . .

ROBERT T. REINHARDT

• Spokane area claim to sobriquet, "Light Metals Capital of the West," is well founded . . . New process for alumina recovery from Washington clay shows promise . . . Lead and zinc mines not neglected.

SPOKANE, Wash.—What steel is to Pittsburgh, aluminum is to Spokane—only more so. It is impossible for even the most casual visitor to ignore the light metal—he might as well try to inspect a coal mine without getting at least slightly soiled.

The plane in which you arrive is largely aluminum; the airport bus has an aluminum body and carries aluminum license plates; you pass scores of buildings and fences made of aluminum; and when you buy a pack of cigarettes you get aluminum tax tokens in your change.

This city is out to sustain its claim as the "Light Metals Capital of the West," and perhaps with the second largest aluminum reduction plant and aluminum rolling mill in the country, it has some basis in fact.

Although the reduction plant at Mead is operating only five of its six potlines, it is still turning out approximately 90,000 tons of aluminum pigs a year for the Permanente Metals Corp. and the Trentwood rolling mills are operating at the rate of approximately 120,000 tons per year.

Mead would be using all of its potlines were it not for the power shortage. Last year when power was available, Permanente officials weren't ready to put all six units in operation and now that they could use the extra pig reduction they can't get the power. With the Tacoma reduction plant coming into production this month Permanente hopes to overcome the current deficit in pig supply.

Light metals is heavy business locally. In 1939 all nonferrous metals industries here employed less than 900 persons and today it is reported that almost 4000 are employed in this field, with a payroll of about $7½ million.

There are now approximately 21 fabricators here using aluminum in some form or other for production of everything from steak platters to oil tanks. Permanente is getting plenty of local support in the search for new uses for aluminum and even the neighboring state of Idaho is going to use its aluminum for 1948 license plates.

No possible economic phase of the light metals industry is being overlooked in the state. At Washington State College, 60 miles from here, the division of industrial research of the Institute of Technology, is conducting pilot studies on the recovery of alumina from clays taken from Castle Rock deposits in Clark County. According to Mark F. Adams of the research staff, they have succeeded in recovering 85 to 90 pct of the 36 pct alumina content of the clay and that the only obstacle to commercial production is the presence of excessive amounts of silica in the recovered alumina.

The Castle Rock deposits have been estimated to contain enough alumina to supply the needs of the entire nation's industry for 10 years if a practical recovery process is developed. Unlike the laterite deposits of Oregon with which Alcoa has been experimenting, the Castle Rock clays are low in iron. According to Mr. Adams, iron content runs about 6 pct and no effort is being made to recover this.

Experiments are now being conducted to eliminate the excess silica and to determine the value of the high silica alumina for conversion into aluminum for use in castings.

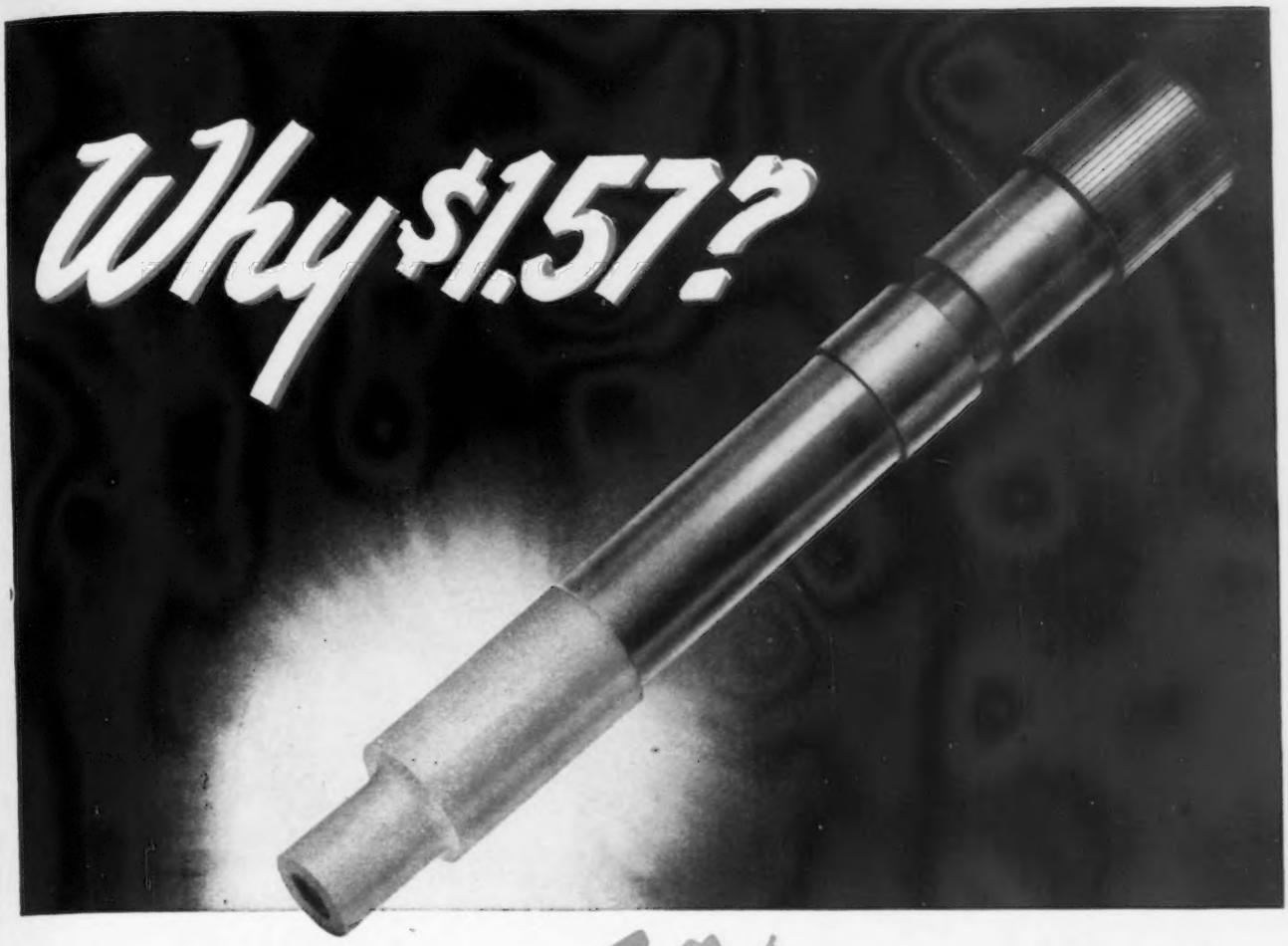
The Washington State College process is described as "sulphate-sulphite" and has been worked out under the direction of Dr. W. A. Pearl, head of the Institute of Technology, and Dr. Eri B. Parker, head of division of industrial research.

AS has been noted here before, the future development and expansion of the light metals industry in the Pacific Northwest hinges on availability of electric power. It was announced last week that the Tacoma aluminum reduction plant of the Permanente Metals Corp. would start operating this month with completion of the installation of the seventh generator at Coulee Dam.

It is now understood that Reynolds Metal Co. will reopen its reduction plant at Longview, Wash., in June 1948. This company lost its power contract when it closed its plant last June and its reopening is dependent upon the completion of the installation of the eighth generator at Coulee. The generator is expected to be ready to ship from the factory in February and probably will be producing power in April or May. Number seven generator which started up last month and made reopening of the Tacoma plant possible, was installed in 30 days with crews working three shifts. The ninth generator is expected to leave the factory about April or May.

This critical power situation explains why promoters of large payrolls are much happier to see rolling mills and fabricators thrive than reduction plants. The Mead aluminum reduction plant for example with a payroll of about 1000 uses approximately 200,000 kw, or 200 kw per man, whereas the Trentwood rolling mill uses only a fraction of the power and has a payroll of approximately 2000.

Some penetrating observers of developments in the aluminum industry are offering suggestions for the change in the attitude of major producers who not so many months ago were explaining reduction plant shutdowns as necessary because of an "oversupply" of pig. While no one will say so in quotable form, there is a feeling that someone—probably in Washington—believes



Harden it for 10¢ with TOCCO

PROGRESSIVE *Kearney & Trecker Corp.*, Milwaukee, Wisc., reports the following savings by TOCCO hardening the above saddle clamp eccentric of their Milwaukee Milling Machine:

	FORMER METHOD	TOCCO
Heat treating	$ 0.721	$ 0.099
Straightening	0.752	0.000
Cleaning	0.100	0.000
Total Cost	$ 1.573	$ 0.099

Saving . . . $1.47 per piece

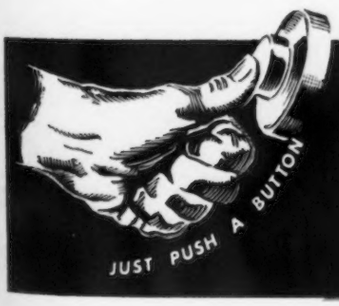
In addition to this saving of $1.47 per piece, TOCCO made possible a switch from alloy steel to S.A.E. 1045 steel, saving $0.110 in material cost per piece.

Total saving on each run of 1375 pieces for this one part is $2,172.50.

Kearney & Trecker hardens a total of 140 different parts on one "TOCCO JR." machine. Output of some parts has been increased as much as 500%.

Why not enlist TOCCO's experienced Engineers to help you obtain similar improvements for *your* production?

THE OHIO CRANKSHAFT COMPANY



TOCCO

MAIL COUPON FOR BOOKLET —

The Ohio Crankshaft Co.
Dept. A-10, Cleveland 1, Ohio

Send free Copy "Induction Heating"

Name .....

Company .....

Address .....

City ..... Zone .... State .....

an "oversupply" of pig aluminum would be a handy thing to have around, "just in case."

ONE light metal plant in this area is still going begging on WAA's bargain counter. This is the so-called Mead magnesium plant which produced that light metal during the war by the ferrosilicon method at a cost of approximately 19¢ per lb.

There have been several nibbles for this unit but all have fizzled out. One group wanted the plant on a trial basis for magnesium production; another wanted it for phosphate fertilizer production; and still another company thought it might be an ideal laboratory. When put to the acid test of laying money on the line, all groups withdrew.

The suggestion has been made that since the plant is still held by the WAA under so-called Section 19, which makes it mandatory for the plant operator to return the facilities to the government in the condition in which they were received on 90 days notice, it isn't too inviting for anyone except a speculator who might hope to use it for magnesium production. This latter is extremely unlikely in view of Dow Chemical Co.'s production costs.

Industrialists of this area are watching another proposed development closely related to the electric power situation. This is the proposal that the federal government develop its supersonic laboratory at Moses Lake. It is known that such a vast program for experimental work in this field will require a power umbrella of approximately a million kw with a 20 pct load factor and no one here knows where that amount of power is available. Coulee Dam will generate about that much when its eighth generator starts to roll.

The hope is that if the federal government decides that the Pacific Northwest is the place for its supersonic laboratory, it will also decide that construction of the Foster Creek Dam to provide the power is also necessary. Since the laboratory demand would not be constant, there probably would be some surplus to sell to industry.

NOT unfaithful to its earlier love and denying complete subjection to the light metals field, industry is still keeping up at least a speaking acquaintance with the other end of the electrolytic scale. While the U. S. Bureau of Mines is still coy about releasing the complete results of its investigations in the Metaline mining district in the northeast part of the state, enough has been given to individual mine owners to cause some of the optimistic investors here to back their belief that the district holds the largest lead and zinc deposits in the country.

When lead and zinc were difficult to come by, the government spent considerable sums to find out where the best deposits were located, and, according to those who claim to know the inside story, this Metaline district was one of the best potentials. Exploration of that section dates back to 1881 when the Chinese placered for silver and lead, but according to the latest surveys only the surface has been scratched. The ores were admittedly low-grade, but easy to get out and until the results of the government survey were released to individual mine owners it was shown that the best ores were deeper than suspected. A peculiar geological formation resulted in a thin layer of low concentrate near ground surface and a richer deposit considerable deeper.

It is this deeper deposit that the miners believe will lift this area into national prominence and result in domination of the lead and zinc market and produce silver in profitable quantities.

With all of this emphasis on the light metals and prospects for national control of lead and zinc production, it might be assumed that there was but little, if any, iron or steel used in the state. Apparently this is not true as local scrap dealers report steady sales of No. 1 heavy to both eastern and western buyers at approximately $22.50 per ton f.o.b. Spokane. This would mean a delivered price in Seattle of approximately $27.

FLYING WING BOMBER: *Powered by eight jet engines, the Northrop flying wing bomber YB-49 soars into the air on its first flight at Hawthorne, Calif., enroute to the U. S. Army air base at Muroc, Calif., for testing. Note the intensity of the black jet-streams which give the impression of rapid fuel consumption and powerful thrust.*

France Seeking Answer To Material Shortages

Paris

• • • **A survey** by the French Ministry of Overseas Territories gives details of industrialization plans for French Indo-China. The plans call for the construction of three blast furnaces of 100 ton capacity and a steelworks for production of 60,000 tons of rolled products.

The survey points out that iron ore mines of Yvonne, at Thai Nguyen, can be brought to 400,000 tons per year, coal to 3,600,000 tons per year, and tin and tungsten mines could be greatly developed.

Dec. Coal Export Quota

Washington

• • • **A December coal export** quota of 3,500,000 tons, of which 3 million tons are for Europe and 500,000 tons for other overseas destinations, has been announced by the U. S. Coal Operating Committee. The December quota is the same as that authorized for November.

Country by Country allocations are expected to be made available for publication later.

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STANDARD
UPCOILERS

Improved features

1. Steel castings or welded steel construction throughout.
2. Roll drive and roll assemblies use anti-friction bearings.
3. All rolls with their assemblies are easily removed thru the outboard housing without further dismantling.
4. All adjustments are readily accessible to the operator.
5. Coil side guides and bending roll adjustments are motor-operated.
6. Coil sizes up to 80" may be discharged from cradle rolls without damage to the material.
7. Improved design incorporates means for stabilizing the coil while rotating on cradle rolls, thereby insuring a tighter and straighter coil.
8. One-shot lubrication system (Optional).

Designed and built with capacity to coil hot or cold strip in various thicknesses and in widths from 24" to 96".

Rugged construction for steel mill service insures continuous performance with minimum maintenance.

Compact design reduces floor space requirements.

The **McKAY MACHINE** *Company*

ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

ASSOCIATED COMPANY The WEAN ENGINEERING CO., Inc. • WARREN, OHIO

Washington . . . EUGENE J. HARDY

• Confidential business and industry data appears safe in National Archives . . . Elaborate safeguards surround use of material submitted to OPA and WPB . . . Government agencies may not use data for enforcement purposes.

WASHINGTON—What is to happen to the vast amounts of confidential cost and production data furnished to the government by business and industry during the war years? This question has perplexed many firms, since release of such data could be ruinous in some instances. The answer is particularly pertinent in view of the publication of scarce stories to the effect that such data would be released.

As to their physical location, these records are placed in the custody of the National Archives as the war agencies are liquidated.

THE IRON AGE, after careful study of the laws and regulations applying to such material and lengthy discussions with Archives officials, is able to report that rumors to the effect that data furnished OPA, WPB and other such agencies would be released in a manner that would identify individual firms have no basis in fact.

Briefly stated, the policy of the National Archives in regard to such data is that material "given in confidence, remains in confidence." The Archives is bound by the provisions imposed by Congress on the release of company data to the same extent as were the agencies to which the material was submitted. Some of the acts which prohibit the disclosure of information about a particular company or information identifiable as pertaining to a particular company are the Federal Reports Act of 1942, the Emergency Price Control Act of 1942, and the Second Deficiency Appropriations Act of 1945.

IN ADDITION, the incumbent head of an agency may also set conditions applying to the use of records originating in his agency and as a stated matter of policy these conditions are continued by the Archivist.

The major portion of the records of the wartime agencies will eventually find their way into the Industrial Records Office of the Archives, headed by Paul Lewinson, who also has charge of most of the records of the permanent agencies which are of interest to business and industry. These war agencies include the Office of Price Administration, Maritime Commission, War Shipping Administration, Office of Defense Transportation, Office of Scientific Research and Development, Fair Employment Practices Commission, War Labor Board, Wage Stabilization Board, War Manpower Commission, the wartime subsidiaries of the RFC, Office of War Mobilization and Reconversion, Office of Economic Stabilization, and the War Assets Administration.

THE records of the War Production Board, Civilian Production Administration, the Combined Boards, Office of Contract Settlement, and the Army and Navy are in the custody of the War Records Office under the direction of E. G. Campbell.

These records undoubtedly give a more detailed picture of the operation of the American economy than any other single body of data. Their selection and transfer to the Archives is a task of no mean proportions. For example, OPA's records totaled about 1,250,000 cu ft. When the job is completed only about 10,000 cu ft of OPA records will rest in the Archives. Some 8000 cu ft have already been transferred.

The WPB records and those of the military agencies are handled with extreme care since many of them are classified top secret. WPB's records do not make up as bulky a package as do those of OPA, comprising only about 5000 cu ft boiled down from approximately 200,000 cu ft.

In general, cumulative data and summary totals are kept as a part of the permanent archives. However, there must be a positive reason for keeping any data and more than an outside chance that such data will prove useful at a later date.

In the boiling down process a large portion of the records are destroyed. Even in such cases, particular care is taken to safeguard confidential data. As the various groups of records were marked for destruction, numerous requests were received from state governments, business schools, local history groups and libraries for data which Archives officials deemed not worth keeping. All such requests were turned down on the grounds that any such material should remain under federal jurisdiction at all times.

WITH such elaborate precautions it might appear that the records are to be put away under lock and key merely to gather dust. This is far from the truth. This material can be used and is available to any citizen, but data classed as confidential will only be given out in a form that precludes the possibility of identification with any particular firm. However, even summaries will not be released if they are revelatory in any way or can be traced to individuals or firms.

Skeptics might raise the point that human judgment still enters the picture in determining what might be revelatory. This is quite

★

What's in a name?

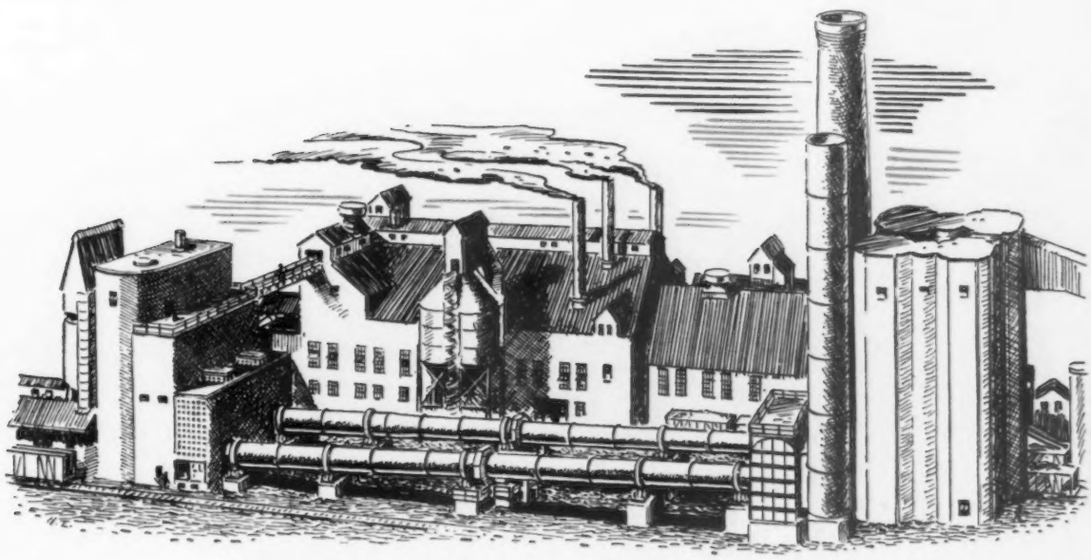
IN the case of Magnefer and Syndolag, the trade names of these well known dead burned dolomite products are backed by the experience of Basic Refractories, Inc. in over 30 years of dolomite refractory production—

—a staff of more than 40 technicians — men and women who are engaged daily in research, development and control in connection with the refractory products of Basic Refractories.

—a record of leadership as evidenced by the introduction of tar sealing, the container car and controlled sizing.

—a modern plant, costing more than $4,000,000 devoted exclusively to the manufacture of basic and neutral refractories and the processing of raw dolomite for refractory, commercial, fluxing and agricultural liming uses.

Magnefer is a ⅜ inch product designed for maintenance of basic open hearth furnaces whereas the sharp rice sized grains of Syndolag make it ideally suitable for fettling electric furnaces.



Basic Refractories Incorporated 845 HANNA BUILDING, CLEVELAND 15, OHIO

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true, but in the Archives only a limited number of people have direct access to the records and outsiders desiring to use the material are not permitted to enter the storage areas.

The number of Archives employees having access to the records in comparison with the thousands of people in the organization's agencies who collected the data is minute. In Mr. Lewinson's office, with its vast collection of economic data, only five people are in direct contact with confidential material. In the Archives as a whole, only 100 people, out of a total employment of less than 350, have access to the records.

On the matter of individual judgment, Mr. Lewinson pointed out to THE IRON AGE that as in any undertaking "good judgment about giving access to records is a matter of integrity and of knowledge. There have never been any lapses from integrity at the National Archives, and the small number of employees who have access to any particular group of records would make any wrongful act very risky. As to knowledge, the responsible people in charge of business records are chosen in part because of their knowledge of the field in which the records are valuable—they know, that is, the importance of cost figures, the structure of important industries, and other conditions which bear on the question of proper and improper use of their records. They know, also, the standard sources of information, and they have access to, and in many cases personal acquaintanceship with, experts in other agencies who can brief them.

CENSUS, Foreign and Domestic Commerce, Federal Trade Commission, and Tariff Commission, for example, can tell us—if we don't know or want to make sure—what the concentration of the widget industry is, so that we can decide whether even aggregate figures of a certain sort must not be given out because they are susceptible of individual breakdown."

Mr. Lewinson further points out that the same restrictions apply to the use of the records by other agencies of government. In fact, bureaus within an agency are sometimes denied access to records turned over by another bureau of the same agency. There is also an absolute prohibition on material in the Archives being used for enforcement purposes, tax and anti-trust cases included.

As for concrete examples on the use of business data, a striking one is the case of a consulting engineer representing a firm in a particular industry who requested information in the OPA files that would give a general idea as to the rise and fall of production, and the factors underlying such changes, in that industry. Archives checked the records and found that such data was available, but also learned that there were only eight firms in the industry and that the engineer's client accounted for 80 pct of the output. Since the release of the requested data would have given one firm a competitive advantage the request was denied.

It should also be remembered that Archives has had custody of confidential records, including such data as the basic material on the Census of Manufactures, for about a dozen years and there is yet to be recorded the first instance of any misuse of such material.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

I KNOW, BUT THAT'S NO CRITERION FOR SUBSEQUENT PROCEDURE! TAKE THIS NOW~~
EDUCATION IS THE ONLY THING THAT EVER AWES TH' BULL--HE'S ALMOST FROM TH' DAYS WHEN YOUR OL' MAN GAVE YOU A SHOTGUN AN' SOME SALT TO MAKE A LIVIN'!
THEY SAY THESE DAYS YOU CAN LEARN WHAT HE KNOWS IN HALF TH' TIME IT TOOK HIM--BUT THAT'S CUZ HE BUILT TH' LADDER WE'RE GOIN' UP ON!
THE IGNORAMUS
11-7
J.R.WILLIAMS
COPR 1947 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.

Reaffirms No Change In Wrench Standards

Washington

• • • **Simplified Practice** Recommendation R220-46, Open-End and Box Wrenches, has been reaffirmed without change, according to an announcement of the Commodity Standards Div. of the National Bureau of Standards. This action was taken by vote of the Standing Committee in charge of the recommendation.

The recommendation covers all double-head, open-end and box wrenches of alloy carbon steel, except those having openings that are not based on standard bolt sizes, such as small ignition or electrical wrenches, midget-type box wrenches, tappet wrenches, brake wrenches, etc. It has been demonstrated that the types and sizes listed in the recommendation are adequate for all regular needs.

Printed copies of R220-46 are available from the Superintendent of Documents, Government Printing Office, Washington 25, at 5¢ each.

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PERSONALS

RAYMOND H. JEBENS, chief chemical engineer, Patterson Foundry & Machine Co.

• **Raymond H. Jebens** has joined the Patterson Foundry & Machine Co., East Liverpool, Ohio, as chief chemical engineer. He was formerly associated with the DuPont Co.

• **Alan G. Orsborn** has been appointed assistant general sales manager in charge of sales promotion, for the Clayton Mfg. Co., El Monte, Calif.

• **J. F. Rankin** has been promoted to the position of comptroller of the Parker Rust Proof Co., Detroit. He succeeds the late **H. J. Strasler.** Mr. Rankin has been assistant comptroller for the past 5 years.

• **Ray Sanders** has been appointed general manager of the Pacific Chemical Co., Los Angeles, a division of the American-Marietta Co.

• **Harold H. Reed,** formerly assistant manager of Air Reduction Sales Co.'s New York district, has been appointed manager of the district. Mr. Reed succeeds **W. S. Schoenthaler,** who is retiring after 37 years of continuous service with the company. **Oren M. Donohue,** formerly assistant sales manager, has been appointed assistant manager, succeeding Mr. Reed. **William B. Brower,** who joined the company in 1922, now succeeds Mr. Donohue as assistant sales manager.

o o o

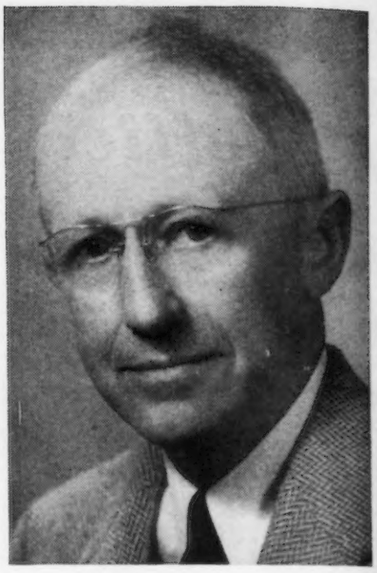
• **J. F. Prince** has been elected treasurer of the Crucible Steel Co. of America, New York. He was formerly comptroller of the ordnance operations of Crucible Steel. **F. L. Cooper** has been appointed to the post of credit manager. Mr. Cooper leaves the office of treasurer to take charge of all credit operations of Crucible. He succeeds **J. M. McComb,** vice-president, who died recently.

• **George Stern,** formerly chief metallurgist, has been appointed director of research of the American Electro Metal Corp., Yonkers, N. Y.

• **S. W. Beal, Jr.,** has been named western area credit manager, Carnegie-Illinois Steel Corp., U. S. Steel subsidiary. This is a new position, and brings to the Chicago office many of the credit functions formerly handled elsewhere. He joined U. S. Steel in 1942, becoming a credit representative of Carnegie-Illinois in Pittsburgh. Three years later he was made assistant credit manager—central area, at Pittsburgh.

• **J. Carl Bowen** has been appointed West Coast sales and service manager for the heating and air conditioning section of the industrial department, Dravo Corp., Pittsburgh. Mr. Bowen will be in charge of sales and service for Dravo Counterflo heaters and crane cab coolers, with headquarters in San Francisco.

• **Charles H. Halford** has been appointed assistant export sales manager of Harbison-Walker Refractories Co., Pittsburgh. Mr. Halford was first associated with the company in 1933 as a salesman in the Cleveland office, being transferred to Buffalo in the same capacity in 1943. His headquarters as assistant export sales manager will be in New York. **Owen M. Griffith** has been appointed Buffalo district sales manager of the company. Mr. Griffith began his Harbison-Walker career in 1930 as a salesman in the Pittsburgh district sales office, later being transferred to Buffalo.



KENNETH SEAVER, chairman of the board and treasurer, Pittsburgh Metallurgical Co.

• **Kenneth Seaver** has been elected chairman of the board and reelected treasurer of the Pittsburgh Metallurgical Co., Niagara Falls, N. Y. Mr. Seaver recently retired as senior vice-president of Harbison-Walker Refractories Co. but remains a director of that company. He is one of the original founders of the Pittsburgh Metallurgical Co. **Charles F. Colbert, Jr.,** has been reelected president of the company. **Ben F. Webster, Jr.,** was elected secretary and assistant treasurer, and **John T. Mechem** has been reelected assistant secretary.

• **Charles T. Marsh** has been appointed sales representative in the territory of Illinois and Indiana for the Acro Welder Mfg. Co., Milwaukee. He served the past 18 years with the Taylor-Winfield Corp. as sales and service engineer. Headquarters for Mr. Marsh have been established at Chicago.

• **Dr. Alex G. Oblad** and **Jack C. Dart** have been appointed director of chemical research and director of development, respectively, for the Houdry Laboratories near Marcus Hook, Pa. Dr. Oblad has formerly been associated with the Standard Oil Co. of Indiana, Magnolia Petroleum Co. and the Texas State Research Foundation. Mr. Dart's career includes employment with Pan-American Refining Corp., Magnolia Petroleum Corp. and Standard Oil Development Co.

FAIRBANKS-MORSE POMONA
VERTICAL TURBINE PUMPS
WATER-LUBRICATED:
OPEN IMPELLERS.
OIL LUBRICATED:
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You can take your choice at the "BIG STORE"...
The "Big Store" is an American institution, where a man can get a better buy from a broader choice. That's why most buyers go to a Fairbanks-Morse-Pomona dealer for their vertical turbine pumps.
They know that these dealers are not restricted in their recommendations. They know that they'll get impartial help in buying the right pump.
For instance, Fairbanks-Morse offers a choice of oil or water lubrication, open or closed impellers. This is greater surety of getting skilled, unrestricted service in obtaining the pump that is most suited to your particular pumping work.
FAIRBANKS-MORSE
SALES
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VISIT YOUR NEAREST FAIRBANKS-MORSE-Pomona dealer: Take advantage of the extra value in trading from the "Big Store in the pump industry"!
FAIRBANKS-MORSE
A name worth remembering
DIESEL LOCOMOTIVES • DIESEL ENGINES • MAGNETOS • GENERATORS • MOTORS • PUMPS • SCALES • STOKERS • RAILROAD MOTOR CARS and STANDPIPES • FARM EQUIPMENT

MARVIN T. ARNSDORFF, JR., manager of general advertising, Southern States Iron Roofing Co.

• **Marvin T. Arnsdorff, Jr.,** has been made manager of general advertising, Southern States Iron Roofing Co., Savannah, Ga. Mr. Arnsdorff joined Southern States in the advertising department in 1937 and left the firm 2 years later to go with the National Pressed Steel Roofing Co. as advertising manager. With the outbreak of the war, he transferred to the shipbuilding division of the Savannah Machine & Foundry Co. He remained there as an engineering draftsman until 1945. At that time, he returned to Southern States as an advertising copywriter. He was named manager of advertising production in 1946.

• **Harry Welch** has been appointed advertising manager of the Falk Corp., Milwaukee, to succeed **Charles E. Petri** who has resigned to enter the printing business. Mr. Welch formerly was with the Milwaukee Electric Tool Co.

• **Frank R. O'Donnell** has been named general manager of the Champion Forge Co., Cleveland. **Lester L. Reuse** has been placed in charge of sales.

• **Philip C. Staples** has been elected a member of the board of directors of the Baldwin Locomotive Works, Philadelphia. Mr. Staples is president of the Bell Telephone Co. of Pennsylvania.

• **Cornelius C. Felton,** vice-president and assistant to the chairman of the board of Revere Copper & Brass Inc., New York, has been elected to the company's board of directors. Prior to joining Revere in 1934, Mr. Felton was sales manager of the Calumet & Hecla Consolidated Copper Co.

• **Milton Welhoelter** has been appointed assistant manager of the design section and **Robert E. Wright** has been named assistant to the section manager, of Monsanto Chemical Co.'s general engineering department, St. Louis.

• **Jerome G. Brady** has been appointed tool engineer and representative working out of the Pittsburgh district office and **Lester Speickhoff** has been made tool engineer and representative in the Syracuse area of Kennametal Inc., Latrobe, Pa.

• **H. C. Allington** has been appointed general manager of sales of the Wickwire Spencer Steel Div. of the Colorado Fuel & Iron Corp., with offices in New York. He joined Wickwire Spencer Steel in 1943 to manage a new products department but within a few months he was appointed assistant general sales manager, which position he filled until the present appointment.

H. C. ALLINGTON, general manager of sales, Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp.

LEICESTER L. LEWIS, director of sales, Tabor Mfg. Co.

• **Leicester L. Lewis,** vice-president of the Tabor Mfg. Co,, Philadelphia, has been named director of sales. Mr. Lewis joined Tabor in 1928 to work on the assembly floor. He next sold molding machines on the road for 3 years, and then became an officer of the company with headquarters in Philadelphia, where he has remained in executive roles.

• **S. H. Hammond,** president of the Whiting Corp., **C. S. Traer,** president of Acme Steel Co., and **Robert Crown,** assistant treasurer of the Material Service Corp. and president of the Sang Corp., have been elected to the board of directors of the Baltimore & Ohio Chicago Terminal R.R. Co., Chicago.

• **Albert R. Becker** has been appointed refractories sales engineer specializing in the marine field of the Babcock & Wilcox Co., New York. Mr. Becker has been with the firm since 1937.

• **W. E. Madden** has been appointed sales and division manager of the conveyer division of the George Haiss Mfg. Co., New York, subsidiary of Pettibone Mulliken Corp. of Chicago. Mr. Madden has been associated with the conveyer industry in a sales management capacity for the past 20 years, and was division and sales manager of A. B. Farquahar & Co. from 1931 to 1947.

VICKERS Variable Speed HYDRAULIC TRANSMISSION

1/2 Horsepower

(PATENTED)

PRICE $75.00

Here is a compact, sturdy, variable speed hydraulic transmission for machinery drive. Any speed from zero to 1750 rpm—*in either direction* can be obtained without reversing the driving motor.

Effortless finger tip speed adjustment over the entire range is obtained by the handwheel control and the selected speed remains constant. A hydraulic servo control mechanism is also available. The full output torque is available throughout the speed range and the built-in automatic overload protection permits stalling without causing damage.

The Vickers hydraulic transmission is automatically pressure lubricated by the power transmitting medium (oil) for long and trouble-free operation.

Contact the Vickers Sales Engineering and Service Office nearest you for complete information.

ASK FOR BULLETIN No. 47-40

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

• **Frederick H. Schomburg,** former assistant comptroller of the Federal Housing Administration and associated for many years with leading construction firms, has been appointed vice-president in charge of the department for sale of going concerns of the Asset Realization Co., New York. **Cyril W. Mayer** has joined the staff of the company and will be in charge of the retail properties division. Mr. Mayer has been in the New York office of the Albert M. Greenfield Co. for the past 4 years.

• **Fred Knisley,** a veteran of 25 years with the Tamms Silica Co., Chicago, has been appointed vice-president in charge of the foundry division. He is also vice-president of the Tamms flooring division.

• **W. H. Bollinger** has been appointed exclusive representative for the Pittsburgh territory of the Esterline-Angus Co., Inc. He has been in the engineering and sales departments of the company since 1933. **T. A. Kenny,** who has been Pittsburgh representative for the past 8 years, will represent Esterline-Angus in the New York metropolitan area.

• **W. R. L'Hommedieu** has been appointed sales representative in the Los Angeles area of Ward Leonard Electric Co., Mount Vernon, N. Y.

• **Percy P. Morningstar** has been appointed manager of the New England branch of Paisley Products, Inc. with headquarters at Boston. **Sam Stewart** will direct the Paisley branch office at Philadelphia.

• **C. H. Wills** has been named general sales manager of the Michigan Abrasive Co., Detroit.

• **Henry N. Muller, Jr.,** former manager of graduate student training, now becomes manager of the entire educational department for Westinghouse Electric Corp., Pittsburgh. His former position will be taken by **Guy Kleis** who previously served as supervisor of engineering training. **Charles W. MacLean,** former educational department manager, has resigned.

FRANK R. KOHNSTAMM, general sales manager, Jack & Heintz Precision Industries, Inc.

• **Frank R. Kohnstamm,** sales executive who for 25 years was associated with Westinghouse Electric Corp. in Cleveland and Mansfield, Ohio, has joined the staff of Jack & Heintz Precision Industries, Inc., Cleveland, as general sales manager. Resigning from Westinghouse in 1942, Mr. Kohnstamm became executive vice-president of the Vander Horst Corp. of America. In 1944 he joined Baldwin Locomotive Works, with which company he filled executive positions resigning as manager of the testing equipment division to take up his new duties with Jack & Heintz.

• **Ernest Richardson** has retired from the presidency of Ingram-Richardson Mfg. Co., Beaver Falls, Pa., after 46 years of service with the company.

• **Louis E. Hirschhorn,** advertising and associate sales manager of the New York Merchandise Co., Inc., New York, will resign as of Dec. 31. Mr. Hirschhorn has supervised and directed advertising and sales promotion activities of this company for the past 23 years.

• **Elwyn T. Gants,** for 7 years general foreman of Youngstown Sheet & Tube Co.'s byproducts and benzol plant at Campbell, Ohio, has been appointed assistant superintendent of the company's Brier Hill coke plant in Youngstown.

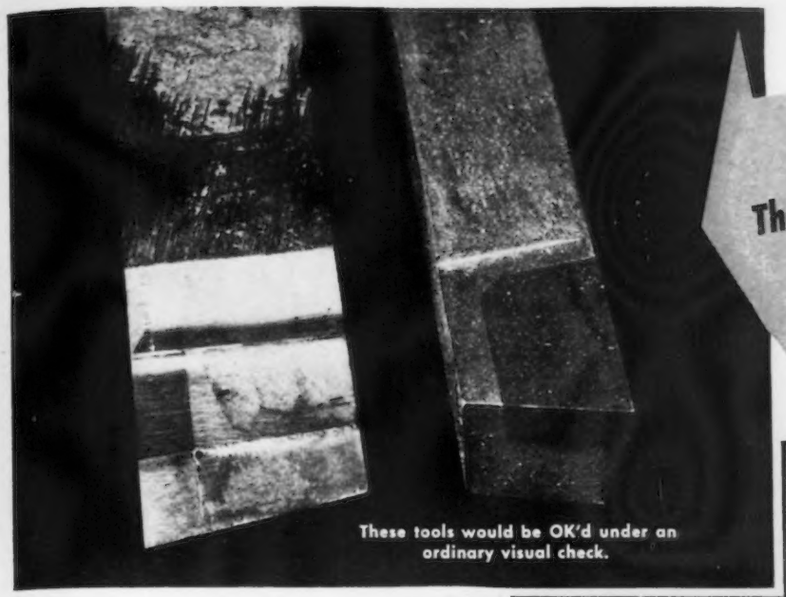
• **Frank T. Lewis** has been appointed assistant manager of General Electric Co.'s Schenectady works. He first joined the company in 1916, and became production manager of the West Lynn, Mass., works in 1940. He then transferred to Schenectady in 1943 when he was named assistant to the works manager. **I. F. Kinnard** has been appointed manager of engineering; **H. L. Ross,** manager of manufacturing, and **E. H. Howell,** manager of sales of General Electric's meter and instrument divisions. Mr. Kinnard was works engineer of the West Lynn works. Mr. Ross was general superintendent of the works, and Mr. Howell was manager of the sales units comprising the former meter and instrument division. **W. E. Saupe** has been named manager, Schenectady turbine manufacturing division of GE's apparatus department; **W. L. Young,** manager, Lynn turbine and gear manufacturing division, and **C. S. Coggeshall,** manager of sales. Mr. Coggeshall was manager of the former turbine sales division since 1938. Mr. Saupe joined GE in 1917, and was made superintendent of the turbine manufacturing division in 1946. Mr. Young joined the company in 1913 and served as foreman of the electrical, maintenance and construction department until 1926, when he was appointed assistant electrical engineer of the buildings and maintenance department.

• **Gerald L. Lawrence** has been named credit manager of the associated lines division of the B. F. Goodrich Co., Akron, Ohio. He joined the company in 1935 and had been a credit manager in Atlanta for several districts since 1945.

OBITUARY...

• **Carl S. Flink,** superintendent of Abrasive No. 2 Norton Co., Worcester, Mass., for 38 years, died Oct. 17.

• **Samuel Crowther,** 67, associated with U. S. Steel Corp., New York, in an advisory capacity during the last 15 years, died Oct. 27.



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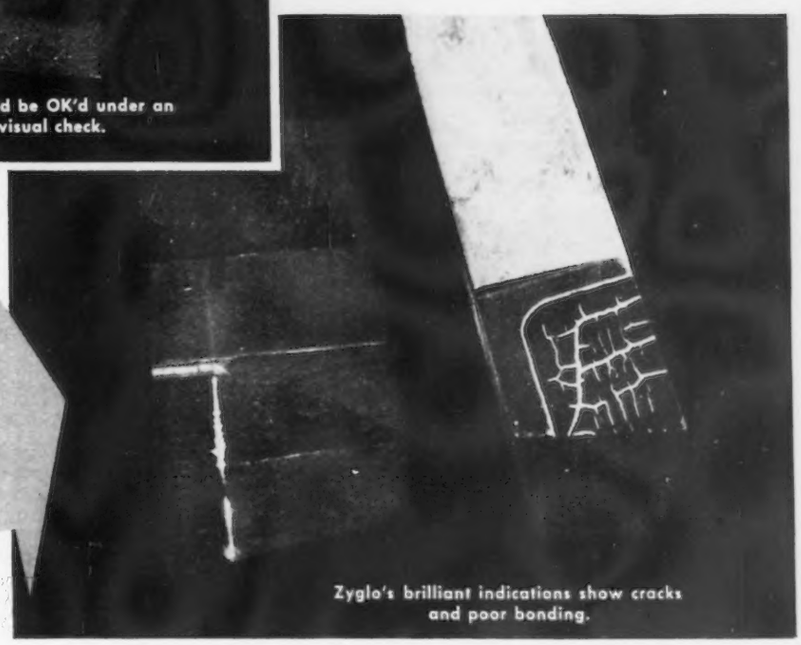

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European Letter . . .

• As hopes for a general scheme for economic revival are raised, Germans are confronted with a program of dismantling . . . Government cannot oppose the plan directly and openly with much effectiveness . . . Any resistance could be met with retaliation.

LONDON — When Germans contested the old level-of-industry plan they were not joining with Anglo-American policy in any uncompromising or irreconcilable way. For the plan was, by its own criteria, nonsense; to any British official in the Ruhr who could see the facts in front of his face, this was as plain as it was to the Germans. And the unfulfilled assumptions about economic unity and so on were always there as a loophole.

With the revised Anglo-American plan, all this is changed. The more luxuriant absurdities of the old plan have been lopped off. The loophole has gone. So has the excuse of four-Power responsibility; the new plan is an Anglo-American decision for the Anglo-American area, and the Germans are assuming for once that the British and Americans mean business.

That the Germans should oppose it, that they should do their best to keep what they can is natural enough. But the campaign against the level-of-industry plan (known by Germans as the *Demontageliste*) bears the marks of passion rather than of calculation; and of a febrile and melancholy passion, too. "Appeals to reason," as an intelligent member of the North Rhine-Westphalian government at Düsseldorf said before the list appeared, "are out of the question."

Outside Germany, where the main argument has been about whether the plan is not too kind to the Germans, this may not seem easy to understand. But one has only to spend 48 hours in the Ruhr for it to become intelligible. It is 2½ years since Allied Forces took Düsseldorf and Cologne and began the occupation of the Ruhr. Most of the towns still look as though war had passed over them a few days ago.

The initial impulse to reconstruct spent itself, within a few months of the end of the war, in the more elementary forms of clearing-up. People patch up their dwellings as they can, and the unauthorized builder is busy; but for every house repaired there is one in which the bomb damage of 4 years ago springs new leaks.

A look at the still-prosperous villages of, say, the Sauerland shows at once the difference in kind of reconstruction; some of those villages were badly knocked about, but the peasant can build his house anew, with stout timber and good workmanship. If there is food in the storerooms, the inquisitive inspector from the building office can be placated.

WHAT is true of housing in the Ruhr is true of industry. Factories produce, but they produce irregularly, bedevilled by the cat-and-mouse tactics of those who order power cuts, getting materials by what shifts they can, bartering their products against repairs and replacements and food for their workpeople.

It is all hopelessly hand to mouth, and the years go by without a glimmer of a prospect of any orderly trading activity, no hope of steady production secure from 1 month to the next against shortages, bottlenecks and prohibitions. The crisis symptoms now appearing in one European country after another are old and familiar in Germany, and many times intensified.

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The dismantling activities of military government may not amount to much compared with what was planned at Potsdam. But place them against this dismal background and it is easy to see how they excite the Germans to helpless exasperation. No doubt many of the major dismantling operations contemplated under the old plan were put off while the revision was being worked out, and many of them will not now take place.

But the innumerable minor removals (under BIOS and under the "multilateral" scheme for advanced deliveries arranged with IARA) have had the same exasperating effect; and it is arguable whether, by removing key machines, we have not done as much to dislocate production in the short run as we could have done by a whole series of full-scale dismantlings. In any case, the Germans see what we take, not what we forbear to take.

It is hard to say whether the Anglo-American plan would have been better received if the dismantling list had been published simultaneously with the general level-of-industry agreement. That agreement was published at the end of August with (after all the delays) a precipitancy which maddened and humiliated the French. Its negative side, the dismantling list, now makes a separate entry so timed that it estranges the Germans no less bitterly.

It is no use imagining that the most skillful tactical handling would have reconciled the Germans to the loss of a further substantial slice of their industry. In any case, the damage is now done. At a time when the more internationally minded among them had begun to hope that a future might open up for them in a general scheme for economic revival in Western Europe they are confronted with no immediate reconstruction plans, but a program of dismantling alone. Naturally, they will do all they can to stop it. The question arises, What can they do?

THE German governments of the *Länder* can oppose, but there is not a great deal that they can do directly and openly to make their opposition effective—without employing their ultimate sanction of withdrawing from the work of government altogether. This threat

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STAINLESS

ALLOY TOOL

BEARING QUALITY

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was used in the food crisis of last spring.

But its consequences for the ordinary German would be disastrous, the extent of its evil political consequences incalculable; what has been done to build up a democratic structure of government would be undone, perhaps irretrievably.

If it is damaging to the credit of a political leader to be associated with unpopular Allied measures, it is damaging, too, to have dodged responsibility. The undermining of sanity will have to go a long way yet before this course is taken.

So it may happen that, while the *Länder* governments, the Minister-presidents' meeting, and the political parties will maintain the strongest formal opposition that they can reconcile with staying in office, the onus of resistance will fall largely elsewhere. It may fall on the trade unions. A speech by Herr Malina, of the transport workers' trade union in the British and American zones, suggested recently that the trade unions might be willing to take on the job of "protecting the interests of the population." Herr Adolf Kummernuss, the chairman of the Hamburg Trades Council, told the British authorities at Hamburg that it was no part of the trades unions' job to egg the workers on to cooperate in the destruction of factories important to peaceful production. After a rebuke from General Clay, Kummernuss added that people like himself, who had sat for years in Nazi concentration camps, would still be prepared to resist "with the means at our disposal" orders which they held to be wrong.

THERE has already been in existence for some months the Altena resolution of the metal workers' trade union assuring workers who refused to work at dismantling of such support as the union could give them. The British Zone Trade Union Federation, in its conference at Bad Pyrmont, has debated the matter.

It is not anxious to embark on a resistance movement, but has to watch its own "militants," who show themselves perfectly willing to take on the leadership of a movement against dismantling, complaisant as their fellow Communists are about dismantling in the Eastern Zone. They may succeed in embarrassing the bizonal enterprise, and they cannot do themselves any harm.

So one can say that the democratic trade union leaderships are certain to declare themselves in strong terms against dismantling; they will do nothing to persuade unwilling workers to the work; and they may be obliged to go in for obstruction. If the last were to happen, the obvious method would be to make the supply of labor for dismantling jobs even thinner and more elusive than it is now.

There is a great deal, short of physical opposition, that can and will be done (it has, indeed, to a certain extent, been done already) to make dismantling slow and unprofitable. The efficient performance of any industrial task in a run-down economy is a matter of priorities. Labor used in pulling down a "surplus" steelworks could be used instead to repair one that is not surplus. Cranes are genuinely needed to build bridges, excavators are in fact wanted for the clearing of bombed towns.

The German railway administration, resisting a claim for wagons to carry away dismantled plant, can say with truth that the wagons are wanted to carry coal or food; it can be reasonably sure of the understanding and, to a certain extent, the support, of the sponsoring branch of the Control Commission. It is really impossible to tell what is obstruction and what merely a reasonable reluctance to waste valuable plant and scarce labor on an unproductive task.

As General Clay has hinted in his sledgehammer way, the occupying authorities have in their hands powerful weapons of retaliation against any open disobedience. They can always withhold food and the supplies. But who will benefit if they do?

Facts Available In Use of Thermoperm For German Meters

Washington

• • • **Information on the** composition, manufacture and thermal and magnetic properties of thermoperm, a complex type of nickel steel used in Germany as a temperature compensating device in the construction of magnetic tachometers, is contained in a British report now on sale by the Office of Technical Services, Dept. of Commerce.

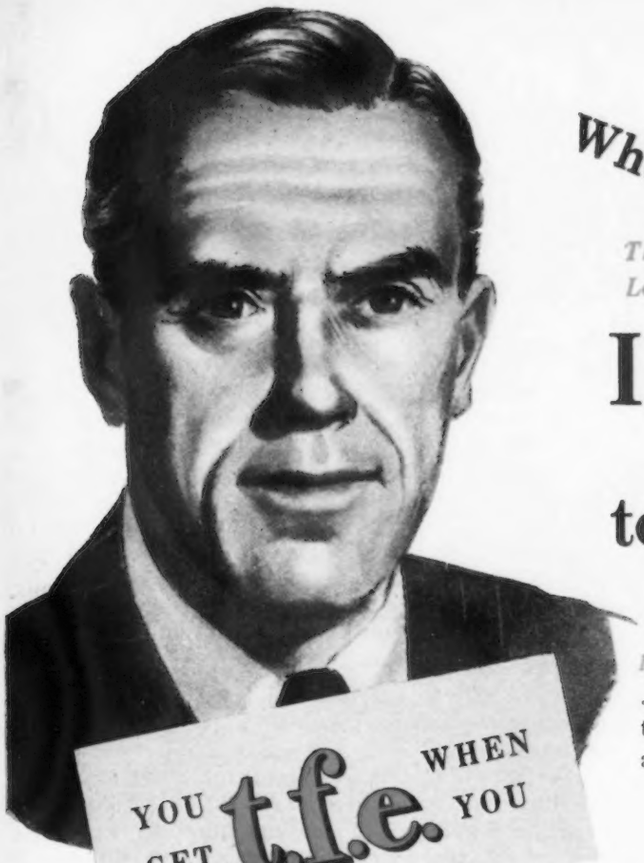
The report describes the tachometer as consisting of a strong permanent magnet located on a spindle connected to a flexible cable drive, which in turn is attached to the geared unit fixed to the shaft whose speed is to be measured. The magnetic field is nearly constant. Between the magnetic poles a soft iron return contact ring rotates with the magnet.

In the annular space between the rings and the magnetic poles is a light aluminum alloy indicator cup or drag link acted upon by the strong magnetic field. The cup rotates on frictionless bearings in response to eddy currents produced as the magnet and return contact ring rotate. This rotating force is opposed or counterbalanced by spiral springs. The angle of deflection of the indicator cup and pointer from the zero position is proportional to the speed of rotation of the magnet and the shaft to which it is attached. Thus the instrument can be calibrated to read in miles per hour.

Since the resistance of the aluminum alloy cup or drag link varies with temperature, compensation for temperature is obtained by fixing shunts of thermoperm to the poles of the magnet. With a rise in temperature the conductive capacity of the shunts will decrease so that fewer magnetic lines of force pass through them, the greater number being diverted to and strengthening the magnetic field. The opposite is true with a fall in temperature.

The composition of the most common type of thermoperm, details of its manufacture, descriptions and photographs of German magnetic tachometers and pertinent tables are included in the report.

Orders for the report (PB-79574; Magnetics; "Thermoperm" and Magnetic Tachometers; photostat, $2; microfilm, $1; 25 pp.) should be addressed to the Office of Technical Services, Dept. of Commerce, Washington 25, and should be accompanied by check or money order, payable to the Treasurer of the United States.



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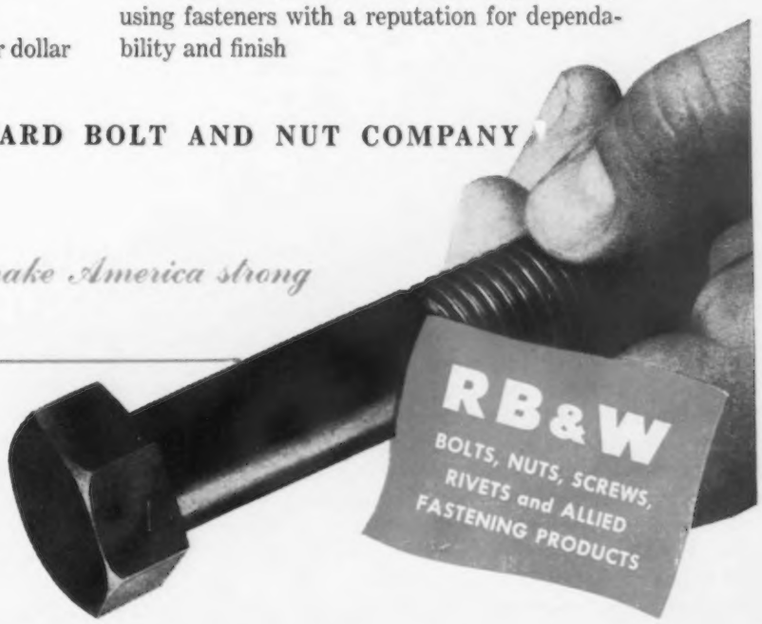

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Industrial News Summary...

- **Scrap Spiral Backbone Is Broken**
- **But Brokers Hold the Bag Now**
- **Steel Will Fight Allocations**

TEMPORARILY at least the backbone of the recent scrap price spiral has been broken. But so far consumers have little solace because a severe testing period is in the offing. Nevertheless, there were no advances this week in the price of scrap at Pittsburgh and at Philadelphia. In the Chicago area there was an average decline of $3.25 a gross ton in the price of heavy melting steel.

THE IRON AGE scrap composite price—based on the average heavy melting steel price at Pittsburgh, Philadelphia and Chicago—declined $1.08 a gross ton this week and now stands at **$41.50 a gross ton.** Out-of-district scrap is still being shipped into Pittsburgh at prices ranging from $45 to $47 a gross ton, while the so-called local market there remains at $40 a gross ton this week. Conditions today in the scrap market are not by any means following the patterns which they have in the past. To say that brokers and buyers alike are confused is putting it mildly.

There is more than a possibility, however, that steelmakers will win part of their fight against inflationary scrap prices. Some officials have insisted that they would close down openhearths before they would submit to a "runaway" market. It will take at least a few weeks to determine if the withdrawal of consumers from the market or the offering of prices from $3 to $4 below recent highs will have any lasting effect on the scrap price trends. It is certain that brokers cannot continue to pay prices for scrap which range from $1 to $3 above what they have recently sold for.

COINCIDENT with the tight scrap situation is unmistakable evidence this week that steel consumers consider the steel shortage at the present time more serious than at any time since the war. The gray market is flourishing to such an extent this week that some sales of cold-rolled material have been made at $300 a ton—a new high and at least $50 a ton higher than was the case a few months ago.

These prices are in sharp contrast to bonafide steel mill quotations which range between $80 to $85 a net ton delivered for the same type of material. Reports from some quarters that steel inventories are far above normal are certainly not borne out by gray market activity and by the sharp expansion in the volume of conversion deals, some of which cost the ultimate consumer premiums of $100 or more a ton.

As if to further confound the situation comes news that January quotas for sheet steel users will be cut below expectations. Some companies have been swamped with new steel orders against 1948 quotas. The volume of consumer orders has been much larger than had been expected. This means that the early part of 1948 will see the steel industry still faced with the difficult problem of distributing available supplies in as equitable a manner as possible.

In recent weeks demand for alloy and stainless steels were showing signs of being in balance, but this week the scene is shifting. Alloy sales volume is now expanding and deliveries on alloy bars have been extended. Part of this change may be due to the short supply of hot-rolled carbon steel bars. There has been a slight pickup in the volume of stainless steel sales. According to one company the overbought condition in the stainless market, which was present some months ago, may be working itself out.

IF STEEL officials have anything to say about it, recommendations made to President Truman by his advisors calling for the allocation of domestic steel output will be fought to a standstill. While steelmakers might not seriously object to the allocation of steel products for export under the Marshall Plan, they will yell bloody murder if an attempt is made to put domestic production under strict distribution controls.

Well might they yell when it is considered that it might take as much as 6 to 7 months to build up the proper personnel for such an allocation system, if such personnel were available. It is a remote possibility that steel companies during peacetime operations would give up their topnotch men for government service as they did during war days. With the distribution picture already being a match for the abilities of those experts in industry, it is inconceivable that government control over steel distribution would produce anything but chaos.

The steel operating rate this week has declined one point to 96 pct of rated capacity. The fluctuation is a normal one and is not due to any definite result of the scrap situation, except to the same extent that maximum production cannot be reached because of metallic shortages. The unusually mild weather has probably added hundreds of thousands of tons of steel to the market because of the postponement of crises in the scrap and coke supply. Some steelmakers can see the possibility of lower operations this winter because of the raw material tightness but no substantial official believes that a drastic decline in future output is in store for that reason.

Automobile makers may find themselves again stymied by the steel shortage if they attempt, as is now expected, to build as many cars in the final quarter of this year as were assembled in the third quarter. Steel companies which are jammed tight with conversion deals are finding it necessary to turn down more of this business unless slabs or sheet bars are furnished by consumers who want them processed. The result of this situation has been to make the spot market for sheet bars and slabs one of the hottest since premium prices first began to be paid for ingots and semifinished steel.

• **STEEL EXPORT CONTROL**—Declaring that "The continued shortage of steel makes any decontrol of steel products in the near future highly unlikely," Secretary of Commerce Averell Harriman has urged the extension of remaining export and import controls beyond the present expiration date of Feb. 29, 1948. The Secretary pointed out that "with total demand so far in excess of available supply, despite significant gains in United States production, the domestic economy must be protected against the adverse effects of unrestricted exports." According to Mr. Harriman, "it is possible that controls may have to be extended to steel products not now under control."

• **STRIKE TREND DOWN** — Less strike idleness occurred in August than any month since March, according to the Labor Dept., which reports 325 new stoppages during the month involving 120,000 workers. However, 175 stoppages continued over from previous months and involving 250,000 workers raised the total to about 370,000. The department reported that the Mediation and Conciliation Service helped clear up 199 strikes which had tied up 235,000 workers.

• **SAFETY IN STEEL** — The ghastly looking Pennsylvania R. R. Pittsburgh train shed has been dismantled without any accident more serious than a turned ankle. U. S. Steel's American Bridge Co. did the job with 40 men in 4 months as passengers moved underneath the wrecking crews. At Chicago, Copperweld Steel Co., uniquely set up to straddle, copped second safety award in the nonferrous metals division at the recent National Safety Congress.

• **CONSTRUCTION INDEX**—Increased production in 14 of the 20 construction material items charted by the Commerce Dept. raised the overall index to 147 (1939 as 100), a peak for 1947. Six of the items, including reinforcing bars and mechanical stokers, reached new monthly peaks. Shipments of structural steel were down from 130 to 119 and cast iron radiation was down from 85 to 80. Cast iron soil pipe showed an increase of nine points to 140.

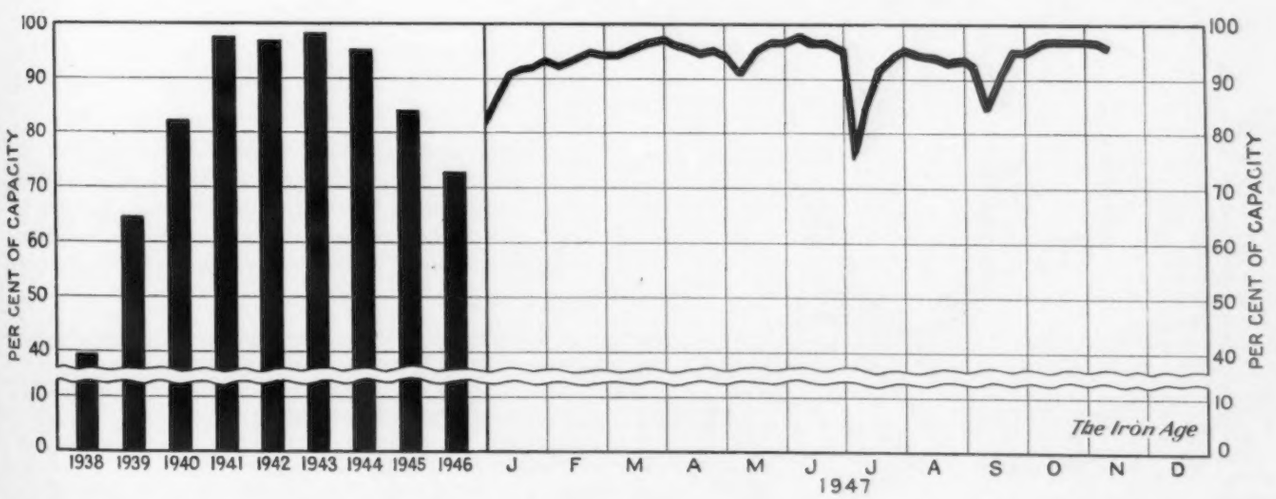
•**SHEET EXPANSION**—An important part of the major expansion and modernization program of U. S. Steel now is well under way at the Irvin Works of Carnegie-Illinois Steel Corp., where capacity to produce sheet and tin plate will be increased by approximately 300,000 tons annually. The first unit to be completed in the expansion program of this plant is a new slab heating furnace for the 80-in. hot-strip mill. Capacity is being increased by installation of a new furnace, and by rebuilding the existing three furnaces, improving handling facilities and enlargement of the slab storage building. New pickling, cold-reducing, annealing, temper rolling, shearing and tin coating facilities together with additional utility and service facilities also are being provided. Two large buildings are now going up to house a new galvanizing division.

• **BIRDSBORO PIG IRON AGREEMENT**—E. & G. Brooke Iron Co. has announced an agreement for the distribution of almost its entire pig iron production during the next 5 years to three consumers. These are Lukens Steel Co., Coatesville, Pa., Worth Steel Co., Claymont, Del., and Warren Foundry & Pipe Co., New York, with plants at Phillipsburg, N. J. and Everett, Mass. According to a responsible source there will be a tonnage of 500 to 1000 tons per month made available under the agreement for Birdsboro Steel Foundry Co., and some local foundries. The agreement went into effect on Nov. 1. However the three consumers are to offer to buy all common stock in the company at $16 per share offered up to Dec. 1. Additional details will be made available to stockholders this week.

• **NEW MILL FOR SUPERIOR**—Superior Steel Corp. has ordered a new three-high roughing mill as part of its $1.5 million expansion program. Primary aim of the program is to improve quality of the firm's hot-rolled products and the width of its clad metals. Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, will build the mill which is expected to be in operation by Jan. 1, 1949.

• **CHARCOAL PIG IRON UP $6**—Tennessee Products Corp. has announced a price increase in charcoal pig iron to $50.00 per ton f.o.b. Lyles, Tenn. Delivered to Chicago, charcoal iron is priced at $56.04.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
October 28	106.0	94.0*	90.0	92.0	96.5	102.0	102.0	98.0	101.0	107.0	104.0	80.0	94.0	97.0
November 4	103.5	94.5	90.0	95.0	94.5	102.0	92.0	99.0	101.0	108.0	98.5	80.0	88.5	96.0

* Revised.

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Mushrooming Industrial Applications Brighten Aluminum Future

Many Substitutions Forced By Acute Steel Shortage May Become Permanent

Chicago

• • • **For the first time** in our industrial history the perennial prophets of the light metal age really have something to talk about. In fact, there is much talk about the use of aluminum in place of steel and in many companies the substitution is far beyond the talking stage. The only time the users of aluminum clam-up on the subject is when they are confronted by the representatives of the industrial magazines who want to go into precise details and want the remarks "for the record."

Aluminum at the moment is a hot subject in more ways than one and the industrial applications now in effect or soon to be tried have mushroomed tremendously in the past year. There are those who believe that the increased demand for aluminum has been caused solely by the steel shortage. Others point out that the steel shortage merely hastened the switch which sooner or later was inevitable. In between these two extremes, opinions and reasons for the heavy aluminum demand are mixed, but the fact remains aluminum is now being used in almost all types of industrial applications and no one will predict where or when the trend will end.

Deliveries of aluminum sheets during the summer were about 4 weeks from most makers and practically immediate delivery could be had from warehouses. Today the increased demand for aluminum flat rolled products has shoved mill deliveries back to 12 weeks for sheets, and warehouses are not so anxious to promise immediate shipment. Some observers here declare that if the present trend continues at the same rate, we may find an aluminum sheet shortage by next year.

This situation is certainly far different than that predicted by many experts at the end of the war. At that time the industry was pessimistic about future business and the government considered the aluminum DPC plants they had on their hands as white elephants.

During the war it will be recalled that the aluminum producers built huge continuous rolling mills which were necessary to meet the heavy demand for flat rolled products by the aircraft industry. Prior to this time aluminum had not enjoyed wide use in large tonnages in flat rolled applications. It was assumed by many that the moment aircraft production ceased the continuous sheet rolling mills would be practically out of business. The opposite has happened.

o o o

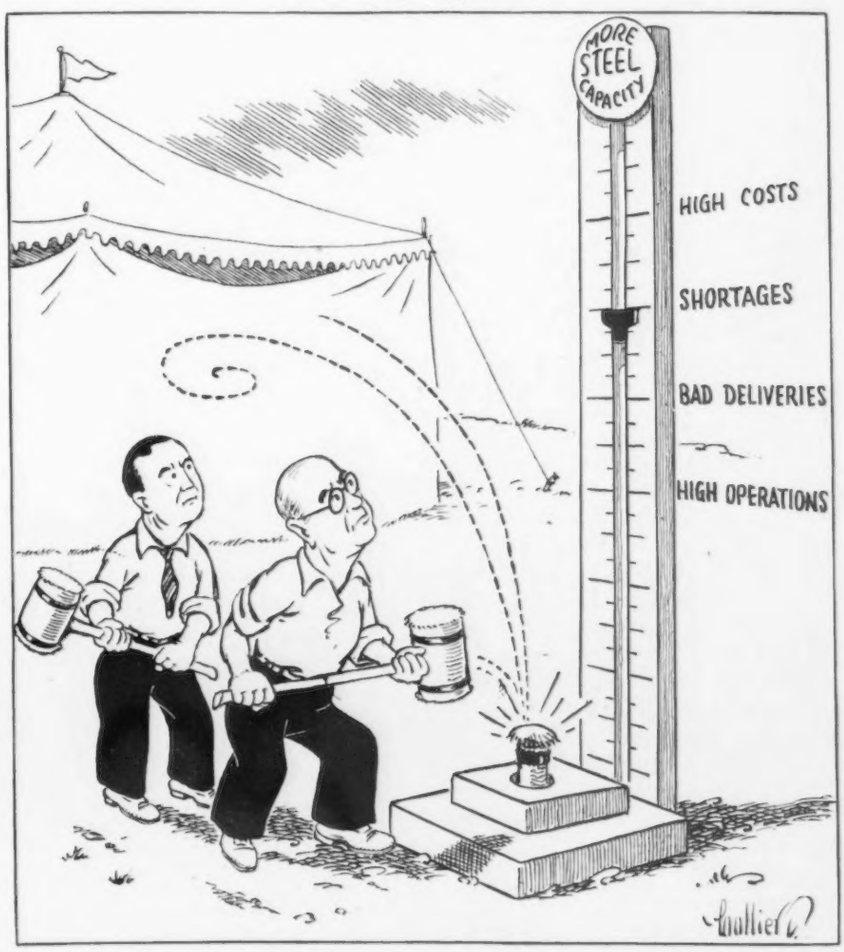
By D. I. BROWN
Chicago Regional Editor

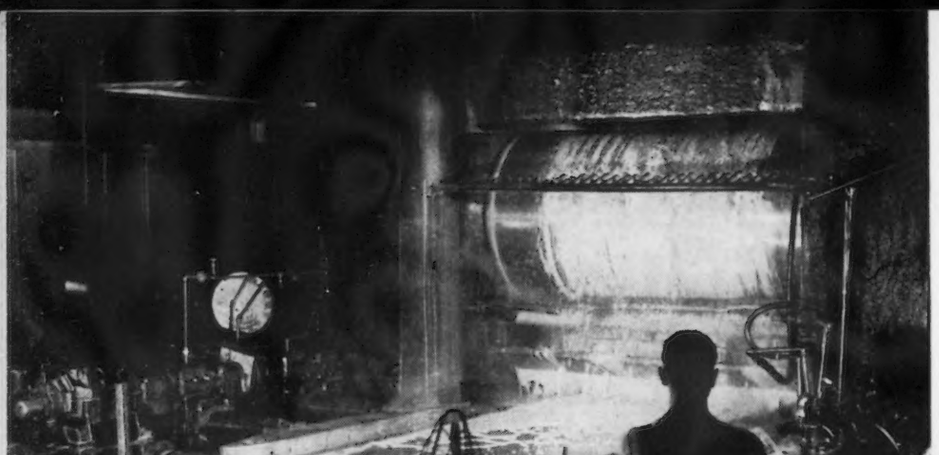
o o o

According to executives of Alcoa, Permanente and Reynolds, their rolling mills are running at capacity. In the table the yearly record of the tonnages produced are compared. Reliable figures on flat rolled aluminum prior to 1942 are not available. The aluminum officials say that this year will top even 1946 and they actually could top the best war year if the present requirements were as concentrated in gage, grade and width as were the war time demands.

For the past 6 months practically all consumers of steel metals have been thinking in terms of substitutions. This thinking has in many cases been forced by a world wide shortage of flat rolled sheet products. Consumers who can't get the steel have exhausted the possibilities of supply through the conversion and gray market channels and

Hit 'er Again





BRIGHT FUTURE: *Due to the acute steel shortage, aluminum is now being used as a substitute for steel in an ever-increasing number of industrial applications. In fact some of the applications have even surprised the manufacturers of aluminum. Pictured here is aluminum being rolled after emerging from the hot mill.*

aluminum is now No. 1 on the pinch hit parade. Some consumers declare the pinch hitter is very likely to earn a regular position in many applications. Others flatly told THE IRON AGE that without question they would return to steel when it becomes available. Both schools of thought admitted, however, that the criterion of use will be purely an economic one and subject almost entirely to price. For the last 8 years the price of steel has continued upward while aluminum has gone down, so that today the break-off point is somewhere between 8¢ and 15¢ a lb, depending on the application.

In other words, users of 0.032 in. thick coil stock who have proved to themselves that aluminum will satisfactorily replace the galvanized, galvannealed, or hot rolled pickled and oiled steel stock they used to buy, consider a steel price of 8¢ a lb the top they will pay for material to make their product.

Over this it is more economical to use aluminum as utility aluminum sheets can be bought at 24¢ per lb, 0.032 in. thick, roller leveled, in sizes from 30 x 96 to 58 x 144 in. in width. In the same gage in coils this stock can be bought in widths from 24 to 48 in. at practically the same price. Alcoa doesn't make utility sheets but their prices are only about 3¢ per lb higher in standard aluminum grades in sheets and coils.

The consumers contacted pointed out to THE IRON AGE that one pound of aluminum goes three times as far as a pound of steel. On the basis of aluminum strip from the mills at 24¢ per lb, steel would have to sell for not over 8¢ a lb to even be considered.

Steel mill and warehouse prices on hot rolled strip and sheet are well below 8¢ a lb but many consumers point out they can't buy it or are unable to get enough tonnage. Gray market steel quotations start at around 9¢ and go to 12¢ per lb of such items, so that aluminum at the moment automatically qualifies on the basis of price alone. Another factor is that all aluminum is sold anywhere in the country on a delivered price basis. Many consumers consider this lack of freight absorption by them as an inducement to buy aluminum.

The aluminum makers are not accepting all orders. They feel they should restrict aluminum to the uses in which it has merit other than just that of price or availability. This situation is similar to that practiced in the steel industry by all makers of low alloy, high strength steel, except one.

Of over 50 manufacturers approached in Chicago on the steel versus aluminum use in one instance, only seven would consider talking to THE IRON AGE for the record. The others preferred not to discuss the situation or wanted all talk on the subject to be off the record. Those not interested in talking for the record were for the most part companies whose past requirements were entirely steel and who are now substituting with aluminum wherever possible. It was intimated that they preferred to be non-commital as any opinion on this subject might jeopardize their position with the suppliers of both products.

Nobody knows what the end result will be. Aluminum producers and steel producers frankly admitted to THE IRON AGE that they cannot evaluate the shift to aluminum at the moment. All hastily added "We wish we could."

One fact is apparent. The lighter material is satisfactorily performing in many applications where its use was highly questionable a year ago. Aluminum's lower modulus of elasticity, higher thermal expansion and conductivity, and the other characteristic differences between steel and aluminum have not been found to be of major importance in most cases of straight substitution. Experience by the companies which have switched to aluminum say the metal has to be worked differently and in cases designs must be changed, but once set up to handle aluminum it's a cinch. In fact, the users are proving to the aluminum industry itself in many cases that the aluminum makers have been somewhat too conservative of the ability of their product to perform on some applications.

The password at the moment is "give us the aluminum sheets, we'll show you how to make them work on our job." Almost grudgingly the aluminum engineers are now admitting to users that the metal will fit in many places where its use was not formerly considered. This is **not because** the engineers weren't cognizant of the facts but rather because their overall policy was to sell aluminum on its merit —not as a substitute. Simultaneously many customers are finding

Shipments of Aluminum Products
Sheets, strip, plates and foil.
Millions of lb.

1942	540.4
1943	774.1
1944	897.8
1945	738.6
1946	866.9

the aluminum technicians were absolutely right. There are places where aluminum won't do the job, but at the moment the go'no-go gage seems to be in the hands of the sheet metal users.

To date aluminum has invaded the steel roofing field and has been widely used in place of galvanized sheets. The ventilating industry has to a very great extent adopted aluminum for duct work. Hot air furnace makers are using considerable tonnages. Manufacturers of dispensing machines are rapidly swinging over and the latest juke box machines are built almost entirely of aluminum and plastic. The large container field has already been cracked. Many companies like the X Steel Barrel Works are making barrels out of aluminum.

More Coming

Chicago

• • • Next week the chief economic, commercial and technical considerations surrounding the substitution epidemic will be reported.

Aluminum is constantly replacing steel in many consumer goods applications such as freezers, stoves, refrigerators, sweepers, shower stalls and similar items. The chances are about one in five that the fancy sun visor purchased to doll up the new car is made of aluminum. Kaiser-Frazer and International Harvester may soon adopt aluminum gas tanks for their vehicles. Many B panels and automotive stampings are now considered in the realm of aluminum possibilities. Home oil storage tanks can soon be expected to be built entirely of aluminum sheets.

How much of this business the steel industry can win back, if and when they are able to do so, is the burning question. Large manufacturers such as Ford Motor Co., Kaiser-Frazer, International Harvester, Allis-Chalmers and many others, are studying each and every part they make to determine the possibilities of using aluminum. The smaller manufacturing companies have already decided, as steel shortages are somewhat more serious to their total production rate, and these concerns are pressuring the aluminum makers for more sheet and strip.

AMERICAN IRON AND STEEL INSTITUTE
SHIPMENTS OF STEEL PRODUCTS
ALL GRADES INCLUDING ALLOY AND STAINLESS
(Net Tons)

SEPTEMBER - 1947
Month

Steel Products	Number of companies	Items	Current Month: Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale) (Net Tons)	Current Month: Per cent of Total Shipments	Current Month: Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale (Net Tons)	To Date This Year: Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale) (Net Tons)	To Date This Year: Per cent of Total Shipments	To Date This Year: Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale (Net Tons)	Whole Year 1946: Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products For Resale) (Net Tons)	Whole Year 1946: Per cent of Total Shipments	Whole Year 1946: Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale (Net Tons)
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	41	1	280,169	5.5	153,990	2,219,393	4.8	1,580,120	1,949,624	4.0	1,645,748
Structural shapes (heavy)	13	2	359,514	7.0	428	3,313,849	7.1	2,392	3,474,284	7.1	5,399
Steel piling	4	3	24,494	0.5	-	240,296	0.5	23	205,313	0.4	141
Plates (sheared and universal)	29	4	494,701	9.7	18,089	4,652,331	10.0	164,439	4,152,181	8.5	250,709
Skelp	7	5	19,239	0.3	35,631	129,049	0.3	290,492	227,033	0.5	194,666
Rails—Standard (over 60 lbs.)	4	6	166,924	3.3	203	1,633,202	3.5	865	1,790,311	3.7	4,890
—All other	5	7	15,567	0.3	-	151,713	0.3	267	144,999	0.3	426
Joint bars	7	8	14,088	0.3	1,503	135,184	0.3	11,752	176,803	0.4	5,327
Tie plates	9	9	41,834	0.8	62	380,907	0.8	3,743	447,496	0.9	18,700
Track spikes	8	10	11,748	0.2	-	127,144	0.3	74	146,194	0.3	693
Hot Rolled Bars—Carbon	34	11	483,991	9.4	45,814	* 4,677,503	10.0	547,619	5,006,859	10.3	707,991
—Reinforcing—New billet	16	12	109,081	2.1	901	947,249	2.0	7,421	1,048,483	2.1	7,381
—Rerolled	11	13	14,692	0.3	-	121,779	0.3	-	141,346	0.3	1,267
—Alloy	27	14	136,735	2.7	15,362	* 1,310,778	2.8	159,774	1,390,278	2.8	138,395
—Total	45	15	744,499	14.5	62,077	* 7,057,309	15.1	714,814	7,586,966	15.5	855,034
Cold Finished Bars—Carbon	29	16	107,463	2.1	717	1,110,469	2.4	6,848	1,316,579	2.7	2,428
—Alloy	26	17	14,909	0.3	236	* 172,683	0.4	1,663	196,237	0.4	1,725
—Total	35	18	122,372	2.4	953	* 1,283,152	2.8	8,511	1,512,816	3.1	4,153
Tool steel bars	19	19	6,270	0.1	140	68,067	0.1	1,163	96,020	0.2	371
Pipe & Tubes—Butt weld	15	20	138,271	2.7	5,531	1,246,890	2.7	50,117	1,276,289	2.6	45,393
—Lap weld	8	21	30,958	0.6	51	295,698	0.6	752	305,516	0.6	238
—Electric weld	11	22	96,826	1.9	571	796,527	1.7	1,685	674,459	1.4	591
—Seamless	10	23	162,565	3.2	10,389	1,535,472	3.3	102,535	1,871,540	3.8	83,441
—Conduit	7	24	13,536	0.3	677	111,604	0.2	6,218	98,521	0.2	2,448
—Mechanical and pressure tubing	13	25	55,273	1.1	1,739	488,719	1.0	15,383	429,180	0.9	3,478
Wire rods	22	26	61,705	1.2	29,555	497,989	1.1	246,614	679,998	1.4	346,506
Wire—Drawn	39	27	220,008	4.3	13,968	* 1,895,992	4.1	* 133,983	1,933,124	4.0	135,592
—Nails and staples	18	28	62,498	1.2	948	606,557	1.3	6,469	636,632	1.3	797
—Barbed and twisted	15	29	21,519	0.4	9	186,891	0.4	67	207,610	0.4	-
—Woven wire fence	13	30	34,179	0.7	330	304,902	0.7	2,791	383,230	0.8	-
—Bale ties	12	31	9,752	0.2	-	90,830	0.2	-	99,993	0.2	-
Black Plate—Ordinary	9	32	59,774	1.1	121	601,121	1.3	1,853	781,167	1.6	3,179
—Chemically treated	8	33	718	-	-	17,119	-	-	125,170	0.3	-
Tin and Terne Plate—Hot dipped	9	34	172,384	3.4	-	1,518,567	3.3	228	1,924,657	3.9	-
—Electrolytic	9	35	131,777	2.6	-	1,146,456	2.4	529	909,175	1.9	-
Sheets—Hot rolled	30	36	602,947	11.8	51,431	* 5,348,965	11.5	* 429,531	5,521,463	11.3	421,198
—Cold rolled	17	37	439,181	8.6	2,383	4,014,039	8.6	19,864	4,075,554	8.4	3,397
—Galvanized	16	38	134,887	2.6	223	1,191,904	2.5	549	1,462,053	3.0	1,725
—Electrical and enameling	10	39	47,080	0.9	-	429,550	0.9	385	435,170	0.9	-
Strip—Hot rolled	23	40	141,647	2.7	28,961	* 1,295,268	2.8	* 219,716	1,363,812	2.8	237,176
—Cold rolled	34	41	136,282	2.7	2,060	1,201,097	2.6	20,854	1,282,146	2.6	25,904
Wheels (car, rolled steel)	5	42	28,837	0.6	-	270,535	0.6	2	252,308	0.5	348
Axles	5	43	14,816	0.3	-	135,930	0.3	53	130,461	0.3	221
All other	-	44	-	-	-	-	-	-	6,266	-	-
TOTAL STEEL PRODUCTS	141	45	5,118,839	100.0	422,083	*46,620,218	100.0	*4,038,833	48,775,532	100.0	4,297,889

During 1946 the companies included above represented 99.5% of the total output of finished rolled steel products as reported to the American Iron and Steel Institute.

* Adjusted.

Earnings Reported By Steel Companies Are Lower During Quarter

New York

• • • **Third quarter earnings** of the steel industry showed a drop of 0.6 pct from the second quarter earnings, according to statistics available from 14 companies representing 83 pct of the country's ingot capacity. Significantly, the third quarter earnings' reports do not reflect a full three months' operations at present price levels, as the most recent price increase did not become effective until late in July.

Among the three largest producers the U. S. Steel Corp. earnings were down by 2 pct. Bethlehem Steel Corp. went down by 17 pct, and Republic Steel Corp. remained at virtually the same level as last month. Other companies which showed profit increases during the past quarter were Youngstown Sheet & Tube Co. and Inland Steel Co. Declines were reported by American Rolling Mill Co., Jones & Laughlin Steel Corp., Sharon Steel Corp., Wheeling Steel Corp., and Crucible Steel Co. of America.

In some cases the profit declines were attributable to bookkeeping operations in transferring large sums to surplus to provide for high mill construction costs, and in other cases high scrap prices and recent freight increases were clearly making an impression on profit margins.

As far as future price increases by steel companies are concerned, U. S. Steel Corp. and its subsidiaries expect to be able to maintain their current prices unchanged for the present, according to Irving S. Olds, chairman. However, Mr. Olds also stated that advancing raw material and freight costs and expected higher wage costs next April might possibly require an increase.

Total earnings to date for 1947 for the companies in the table below are $276 million, and projected for the last quarter on the basis of third quarter results will equal $357 million. If achieved for this year, that total would be $111 million above the total for strike-bound 1946, and $200 million above the reconversion plagued 1945.

TABLE I

Summary of Steel Company Earnings

COMPANY	THIRD QUARTER EARNINGS		FIRST 9 MONTHS EARNINGS	
	1947	1946	1947	1946
UNITED STATES STEEL CORP.	$28,735,082	$33,329,000	$97,308,461	$57,467,894
BETHLEHEM STEEL CORP.	10,211,336	10,534,005	38,710,728	29,794,650
REPUBLIC STEEL CORP.	6,380,016	5,039,071	23,111,631	9,494,414
JONES & LAUGHLIN STEEL CORP.	4,979,482	2,952,716	16,682,738	6,109,260
YOUNGSTOWN SHEET & TUBE CO.	4,817,608	4,871,852	19,446,836	9,176,395
NATIONAL STEEL CORP.	6,802,840	6,254,976	19,903,655	13,941,320
INLAND STEEL CO.	7,670,295	4,927,473	21,791,583	9,900,773
AMERICAN ROLLING MILL CO.	5,934,418	5,466,068	18,165,398	12,488,684
SHARON STEEL CORP.	1,375,000	1,493,715	4,760,167	1,442,349
WHEELING STEEL CORP.	2,640,189	2,085,120	8,430,261	3,188,041
CRUCIBLE STEEL CO. OF AMERICA	23,639	251,436	1,291,663	167,720
ALAN WOOD STEEL CO.	439,096	463,515	1,433,121	330,140
ALLEGHENY LUDLUM STEEL CORP.	1,036,332	2,113,012	4,553,972	4,559,140
CONTINENTAL STEEL CORP.	357,036	303,033	998,490	694,147
TOTALS	81,402,369	80,081,992	276,586,704	158,754,927

U. S. Steel Corp.

ITEMS	Third Quarter 1947	Second Quarter 1947	Third Quarter 1946	Jan.-Sept. 1947	Jan.-Sept. 1946
Net income	$28,735,082	$29,336,863	$33,329,000	$97,305,461	$57,467,894
Dollars per share	$2.58	$2.65	$3.11	$9.01	$4.43
Sales in $ millions	$518	$534	$409	$1527	$1024
Shipments—net tons	4,808,277	5,288,716	4,457,000	14,940,667	10,345,010
Pct ingot operations	90.2	98.1	94.3		
Average employees	287,217	285,915	276,793	283,031	263,701
Total payroll	$221,672,393	$223,855,192	$194,888,028	$645,203,328	$498,512,123
Average pay per employee	$772	$783	$704	$2280	$1889
Pct payroll to sales	42.8	41.9	47.6	42.3	48.7
Net income per ton of shipments	$5.98	$5.55	$7.48	$6.51	$5.56

Bethlehem Steel Corp.

ITEMS	Third Quarter 1947	Second Quarter 1947	Third Quarter 1946	Jan.-Sept. 1947	Jan.-Sept. 1946
Net income	$10,211,336	$12,408,966	$10,543,005	$38,710,728	$29,794,650
Dollars per share	$2.87	$3.61	$2.99	$11.32	$8.34
Sales (in millions)	$241	$266	$223	$744	$562
Shipments—net tons	2,383,000	2,330,000	2,254,000	6,909,000	5,148,000
Pct ingot operations	96.0	99.3	97.9		
Average employees	143,681	141,500	145,547	143,500	146,400
Total payroll in millions	$93	$108	$101	$302	$286
Earnings per hr.	$1.65	$1.592	$1.485		
Pct payroll to sales	38.6	40.6	45.3	40.6	50.9
Net income per ton of shipments	$4.29	$5.32	$4.68	$5.60	$5.79

Weekly Gallup Polls . . .

Russia Makes Little Progress in Dividing American Opinion

Princeton, N. J.

• • • **All signs point** to the fact that Stalin, Molotov and Vishinsky are making some colossal mistakes in judging the American public mind today regarding Russia, according to George Gallup, director, American Institute of Public Opinion.

A favorite Soviet tactic has been to make it appear that opposition to Russia in this country is confined largely to "Wall Street interests," "reactionary capitalists" and wealthy groups in general.

The fact is, however, that the working population, the farmers, the white collar class and other "little fellows" are almost as critical toward Russia as the well-to-do, and sometimes more critical.

No sharp cleavage of opinion along social or economic lines stands out where Russia is concerned. There are, to be sure, some differences in attitude among groups. But these differences are comparatively small.

Institute surveys have in the past uncovered the rather ironic fact that the wealthier, better-educated groups in the American population have at times taken a more friendly attitude toward Russia than the groups of manual workers, office workers and others whom Marxists are fond of calling the "proletariat."

For example, the institute recently sounded opinion on whether the United States is being too soft or too tough toward Russia. People in all walks of life and in all states were questioned on that issue.

The vote showed that all major occupation groups think our policy is too soft and that the manual workers were somewhat more of this opinion than the professional, business and white collar groups.

Another survey of a little more than a year ago found that among the manual worker group a higher percentage of voters thought Russia was out to try to be the ruling power of the world than was the case among the professional and business class.

Although recently there has been a growing suspicion of Russia among the better educated voters, an analysis of attitudes by groups still indicates that all classes in the population see essentially eye-to-eye on the subject. No very significant distinction between general opinion and the opinion of so-called "capitalist reactionaries" can be made today.

The institute recently polled on the question of whether the United States should make a separate peace with Germany and Japan if Russia refused to participate in a treaty satisfactory to the big five powers.

Here is the vote by occupation levels:

	Separate Peace		
	Approve	Disapprove	No opin.
	Pct	Pct	Pct
Prof. & Bus.	60	25	15
Farmers	57	19	24
Manual workers	56	23	21
White collar	52	31	17

•

• • • **Now that America's** second food-saving program since V-J Day is a month old, the proper time has come to study the public's first impressions of the Food Conservation Program headed by industrialist Charles Luckman.

Here are some points that can be made upon analysis of an intensive survey conducted by hundreds of institute interviewers throughout the country:

(1) Perhaps the most important observation is that a majority of American adults with opinions believe that real need exists in Western Europe for food from this country. Only one out of three believes sacrifice on our part is unjustified.

(2) More than six out of ten people say their families plan to follow or are following the suggestion to eat no meat on Tuesdays, with another 4 pct say they will cooperate whenever possible. Only one fourth claim that meatless Tuesday's suggestions is too difficult to carry out.

Today's willingness to follow governmental food-saving suggestions is strikingly similar to that

Public Recognizes Need For Food-Saving Program to Help People of Western Europe

o o o

found by polls taken in 1946 during the Famine Emergency Committee's program. In March of that year 56 pct of American families said they were taking part. By June the figure rose to three out of four families, indicating that present efforts may also gather momentum as people become better informed as to what is expected.

(3) Better than nine out of ten people already have either heard or read about President Truman's food-saving scheme, a very high rate of public awareness for any issue. Of those familiar with plan, six out of ten grasped the idea that the program is designed to save food in order to send relief to European nations. Another 26 pct mention that objective first and then add another such as reduction of prices or fighting communism.

(4) Mr. and Mrs. Consumer also seem to have a fairly clear idea about what the government wants them to do. Interviewers asked this question:

"Will you tell me all the things that the government wants you to do in the food-saving program?"

The answers:

14 pct were essentially correct, listing meatless and poultryless days and reduction of bread consumption.

36 pct mentioned at least one of the three steps.

35 pct said we are asked to cut down on use of grain, grain products, eggs or meat.

39 pct said "eat less and waste less."

18 pct either did not answer or gave incorrect answers.

(Adds up to more than 100 pct since some respondents gave more than one answer.)

(5) The Administration has a difficult educational job before it to convince a third of the nation that Europe's situation warrants a voluntary rationing program. It would be well-advised, also, on the basis of the above figures, to define clearly each step it wants consumers to take.

Treasury Dept. Favors Carrying Forward Of Losses for Taxation

Washington

• • • **A 5-year** period over which industry would be permitted a carry-forward of losses, both incorporated and unincorporated businesses, is favored by the Treasury Dept. over the carryback method for income tax purposes.

This is revealed in a summary of the Treasury's study of alternate methods of revising the federal tax laws with respect to the treatment of business losses. The study was prepared by a committee representing both the Treasury and the House-Senate Joint Committee on Taxation.

"The length of carryforward should be limited primarily by administrative considerations," the study went on to say. "However, most of the desirable effects of a loss offset can be achieved within a period which is administratively feasible . . . Five years appears to a satisfactory period within which to start, subject to later review and, perhaps, revision."

The report admits that treatment of business losses in postwar tax revision poses a major problem because of the part it plays in the year-to-year determination of net income and the avoidance of taxation of capital as income.

Averaging of taxable income through use of the carryback and carry-forward method has been applied at various times since 1918. It was dropped from the code, effective with 1932, but was revived again in 1939. This was supplemented by a 1-year carryback for 1942 losses and a 2-year carryback for 1943 and subsequent years.

General Motors Reports Third Quarter Earnings

New York

• • • **Net sales of** General Motors products for the third quarter of 1947 totaled $941,733,864 and pay rolls amounted to $285 million, while net income was $75,658,274, Alfred P. Sloan, Jr., chairman of the board, and C. E. Wilson, president, reported to more than 436,000 stockholders recently. For the first 9 months of 1947 net sales totaled $2,688,155,347 and pay rolls $847 million with net income $213,217,476.

After deducting regular dividends of $3,232,078 on the preferred stocks from the net income for the third quarter of 1947, there remained net income of $72,426,196 available for the common stock, equivalent to $1.65 per share on the average number of common shares outstanding. For the first 9 months of 1947, after providing regular dividends of $9,696,232 on the preferred stocks, there was available for the common stock $203,521,244, equivalent to $4,62 per share.

Asserts Antitrust Suits Ineffective For Price Control

Chicago

• • • **Speaking before a session** of the Business Problems School of the Chicago Association of Commerce and Industry, Federal Trade Commissioner Lowell B. Mason asserted that present day antitrust laws are ineffective.

"Unless present high prices are the result of illegal restraints of trade provable in court, there is nothing that the Dept. of Justice or the Federal Trade Commission can do about it, unless, of course, you want to go to a police state with bureaucrats setting all price schedules," he said.

As evidence of the ineffectiveness of the antitrust laws, Mr. Mason cited the Federal Trade Commission suit filed against U. S. Steel back in 1921 and the Cement case which was started in 1937, neither of which has yet reached final decision in the Supreme Court.

Mr. Mason then superimposed the latest complaint filed against the steel industry last August 14 on the timetable of the above cases and arrived at the startling conclusion that the latest suit against the steel industry would not be settled before 1957.

"When this case is finally settled in 1957, come around and tell me if you think the 5 million dollars that the steel industry and Government will spend on lawyers, experts, reporters and legal printers will come out of the steel company's pocketbooks, or if it will be

Postponement

Washington

• • • American Iron & Steel Institute and other respondents in the Federal Trade Commission's basing point suit against the industry now have until Nov. 17 to answer the commission's complaint. Originally set for Nov. 1, the extension of time was granted when counsel for the respondents told FTC the earlier deadline allowed insufficient time to present the industry's arguments.

The Supreme Court, meanwhile, is weighing arguments presented by FTC and the cement industry in a parallel case. A decision is not expected for at least another month, however.

Coming Events

Nov. 6-7 National Founders Assn., annual meeting, New York.

Nov. 6-7 Society of Automotive Engineers, fuels and lubricants meeting, Tulsa, Okla.

Nov. 7 Openhearth Committee, AIME, annual meeting, Pittsburgh.

Nov. 7-8 Annual Conference on X-Ray and Electron Diffraction, Mellon Institute of Industrial Research, Pittsburgh.

Nov. 10-13 American Institute of Steel Construction, Inc., annual meeting, Miami Beach, Fla.

Dec. 1-3 Society of Automotive Engineers, air transport meeting, Kansas City.

Dec. 1-5 American Society of Mechanical Engineers, annual meeting, Atlantic City, N. J.

Dec. 1-6 Twenty-First Exposition of Chemical Industries, New York.

Dec. 4-6 Electric Furnace Steel Committee, AIME, annual conference, Pittsburgh.

Jan. 12-16 Society of Automotive Engineers, annual meeting, Detroit.

Jan. 12-16 National Materials Handling Exposition, Cleveland.

Jan. 19-20 Institute of Scrap Iron & Steel, Inc., annual convention, Chicago.

Mar. 18-19 Magnesium Assn., annual meeting, New York.

in the price of your washing machine, your car or your kitchen sink," he said.

"Because the administered price lacks the St. Vitus Dance quality of an Adam Smith price, it is often associated with the frozen prices of a conspiracy, and many bureaucrats in Washington believe that for this reason administered prices should be done away with."

Mr. Mason then asserted that if the car manufacturers had thrown their cars into the Adam Smith market of used cars instead of selling them as new cars in the administered market, they could have jacked up over-all prices to the tune of two billion dollars.

Mr. Mason pointed out that Senator Martin's committee found Adam Smith steel prices of $600 a ton, "but if you will take the results of a comprehensive survey made by THE IRON AGE, we can estimate the weighted average of gray market prices amounts to at least $114 more than the average delivered price for cold rolled steel which is around $80 a ton."

"Suit or no suit, in my opinion the price of steel in 1957, in fact a lot earlier than that, will be $100 a ton instead of $80," Mr. Mason asserted. In support of this contention he referred to the following statement by steel expert T. W. Lippert, directing editor of THE IRON AGE:

"The big integrated units are making steel (and profits) on enormously expensive equipment being depreciated tax-wise on the basis of prewar costs. How is this equipment to be replaced? A 70-oven 390,000-ton coke oven battery cost $2,500,000 in 1943; today its actual cost is $6,000,000. An 80-in 10-stand strip mill cost $5,700,000 in 1937; today its actual cost is $10,500,000. In 1937 the field labor cost on a 20 x 80-ft reheating furnace was $24,500; an exact duplicate today costs $53,327. And so on, some better, some worse, for all producing equipment."

Mr. Mason then again referred to the antitrust suits — "We are guilty of equivocation if we are unwilling to interpret what we are willing to sue on. The present antitrust laws are the basis for certain antique court rituals which have little or no effective connection with the social, economic, and democratic needs of our people."

Government to Seek Foreign Patents On List of Inventions

Washington

• • • **The first list of** government-owned inventions on which the United States government will file foreign patent applications for firms interested in securing foreign patent rights has been released by the Office of Technical Services, Dept. of Commerce.

Under this new program, described in THE IRON AGE, October 9, p 94, government funds are not available for the prosecution of foreign patent claims, and the cost of securing such patents must be borne by the individual seeking foreign protection. Licenses under such foreign patents will be available to United States citizens on the same basis as licenses under government-owned domestic patents—namely, for non-exclusive use and royalty-free.

This first compilation covers 84 inventions in such fields as drugs, food, instruments, lumber, machinery, metals, packaging, paper, and building materials. Other lists will be released periodically. Some idea of the scope of these government-owned patents can be obtained from the accompanying selected list:

Title of Invention	Description
Improved Coating Material (FP 26)	Resin suitable for formulation of tough, durable coatings on cans and other objects. Replacement for tin from whey, dairy by-product. (Three U. S. patent applications).
Apparatus for Corrugating Thin Sections (FP 50)	Veneer, plastic laminate or metal sheets can have all corrugations made simultaneously without tensile stress.
Method for Handling Molten Magnesium (FP 52)	Molten magnesium made to flow from cell container thru unbalance of two connected columns of metal, one lightened by gas bubbles dispersed in it.
Melting Magnesium and Magnesium-base Alloys (FP 53)	Reservoir for molten metal immersed in fused salt bath, accepts metal by gravity flow; impurities settle to bottom and are removed by valve arrangement.
Melting Hafnium, Zirconium and Titanium Metals (FP 54)	Believed most efficient and convenient method for melting, treating and casting corrosion-resistant (Periodic Table Group IVa) metals for commercial use.
Silver-Plating Process (FP 55)	Process for plating very thin non-porous silver coat through formation of additional silver chloride layer.
Froth Flotation Processes — Magnesite (FP 56)	Beneficiation of magnesite to remove siliceous and other materials through treatment of water-mixed "pulp" with various reagents and subsequent aeration.
Wire Drilling of Diamond Dies (FP 57)	Device for preparing diamond wire-drawing dies by drilling and grinding hole and cone in diamond with fine-wire drill.
Conditioning of Molten Metal (FP 58)	Easily-oxidized metals (like magnesium and magnesium-base alloys) are superheated (850-950° C) prior to foundry use to produce relatively fine-grain castings.
Improved Adhesion for Electro-plated Coatings (FP 59)	Use of A.C. current in electroplating bath prior to desposition of coating to secure better final adhesion.
Erosion — and Heat-Resistant Steel Alloy (FP 60)	Chromium-molybdenum-tungsten steel alloy resistant to powder-gas erosion and plastic deformation at high temperatures.
Improved Grain Structure for Magnesium Alloys (FP 61)	Introduction of carbonaceous agent into molten alloy to produce subsequent grain refinement.
Alloying Manganese with Magnesium (FP 62)	Direct alloying of relatively coarse manganese with molten magnesium prior to addition of aluminum.
Superheating Magnesium Alloys for Fine Grain (FP 63)	Certain magnesium alloys heated to 900-950°C., granular carbon added to produce fine grain structure.
Electrolysis of Light Metals (FP 64)	Cells for electrolytic production of calcium, magnesium, sodium, etc., with pump intake for sludge removal.
Alloys of Magnesium and Calcium (FP 65)	Method to overcome tendency for rapid oxidation of calcium when alloyed with magnesium and to prevent reaction with magnesium chloride flux.
Ingot Scalping Machine (FP 66)	Endless chain device particularly adapted to non-ferrous metals for feeding ingots to rotary cutter.
Inhibiting Oxidation of Magnesium (FP 67)	Dusting of molten metallic magnesium with pulverized calcium oxide to prevent oxidation when exposed to air.

Steel Requirements Under Marshall Plan Revised Downward

Washington

• • • **U. S. government** officials meeting with representatives of the Western European nations have scaled down steel requirements under the Marshall plan, according to the report of the Paris conference published last week end. Crude steel requirements from the U. S. were called out for 1948 at 2 million tons, as had been previously predicted in THE IRON AGE, but the 1948 scrap needs have been scaled down from an original request for 2 million tons to a revised estimate of 1.4 million tons.

In a further effort to soften the blow of the scrap needs the report of the Paris conference, as Vol. 2 was published last week, indicated that pig iron would be acceptable as a substitute for the scrap.

Finished steel needs were also revised before the report was made public in this country. The 1948 needs, outside of sheets and tinplate are estimated at 449,000 tons, although the best estimates made in Paris were that about 1.5 million tons would be required. Most of the revisions have been made in Washington taking into consideration the availability of various steel products in this country, rather than on the basis of any reduced requirements.

Reduction Agreement Reached Between Government And Foreign Delegates

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A new innovation to be set up as a result of the Paris conference will be a continuation of the meetings of the steel committee, starting with a meeting on March 18, 1948. The interested Western European nations will send representatives to keep the steel statistics up to date, exchange information on their respective modernization plans, and endeavor to assist each other in expanding production.

Assuming that fuel supplies will not restrict production, the committee report estimates that production of crude steel in the participating countries will be 16 pct higher in 1951 than in 1948. In 1948 production will be slightly above the aggregate output of the most active prewar years, and in 1951 it will be nearly 60 pct higher than the output estimated for 1947 and 25 pct higher than the aggregate of the most active prewar year. Proportionate increases for finished steel production are slightly higher.

"There are hopes, if energetic measures can be taken to increase output and exportable surpluses, particularly from Western Germany, and to decrease consumption, that the coke deficit will be overcome," the report states.

"The orders of magnitude are indicated by the calculation that if supplies of hard coke to the industry fall short by 4 million tons (compared with the total deficit of about 12 million tons in the original over-all hard coke budget for 1948) crude steel production will fall short of the target by 4.8 million tons, which will call for an appropriate increase in steel import requirements from nonparticipating countries," the report continues.

Expansion of capacity will come about in 1951, when new works now in the stage of site preparation will come into operation, the report estimates. The United Kingdom and France will be the major contributors to new capacity. Other countries concerned are Austria, The Netherlands and Sweden for general expansion of all the main stages of production, Italy for pig iron and crude steel and Denmark, Luxenbourg and Switzerland for steel finishing.

Except for iron and manganese ores, nearly the whole of the im-

Import Requirements of Participating Countries and Western Germany from the Americas

(Thousands of metric tons. Millions of U. S. dollars)

	1948				1949				1950				1951			
	From the United States		From other Western Hemisphere		From the United States		From other Western Hemisphere		From the United States		From other Western Hemisphere		From the United States		From other Western Hemisphere	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Crude and semi-finished steel (actual weight).	2,040	129	300	21	2,090	132	300	21	2,250	142	300	21	2,170	137	300	21
Finished steel, other than sheets and tinplate.	449	41	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sheets	385	60	—	—	180	28	—	—	31	5	—	—	—	—	—	—
Tinplate	291	47	—	—	285	46	—	—	269	43	—	—	250	40	—	—
Rich iron ore	—	—	1,180	7	—	—	1,190	7	—	—	2,000	12	—	—	2,100	13
Manganese ore	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ferro-manganese	55	6	5	1	68	8	5	1	78	9	5	1	83	10	5	1
Scrap (or pig-iron equivalent)	1,399	51	—	—	1,753	64	—	—	2,091	76	—	—	2,231	81	—	—
Pig iron	182	7	—	—	68	3	—	—	—	—	—	—	—	—	—	—
Plant and equipment	—	100	—	—	—	100	—	—	—	100	—	—	—	100	—	—
	—	441	—	29	—	381	—	29	—	375	—	34	—	368	—	35

port requirements of the participating countries and Western Germany can only come from the Americas, the report states, adding that "indeed they must be sought almost wholly from the United States."

"It must be emphasized," the report continues, "that the import requirements are calculated on the assumption that raw material supplies will allow full use of iron and steel-making capacity in the participating countries. If this is not possible, a larger program of imports of steel (or pig iron) from the U. S. must result." Conversely, if production in the participating countries can be raised to the maximum, import requirements of finished steel (other than tinplate and sheets) from the U. S. will quickly fall away.

The committee sees the demand for imports of semifinished steel as remaining "fairly steady" throughout 1948-51, but it will fall away thereafter as new capacity comes into operation in the participating countries, particularly in the United Kingdom and Italy, and by 1955 this demand is likely to be quite small. "The future trend of import requirements of scrap (or pig iron equivalent) from the U. S. is very difficult to forecast, but it seems likely that a demand of one to two million tons a year may continue for some time," the report says.

Two factors indicate that the committee's estimates will be subject to "substantial variations," the report points out. (1) Steel requirements are subject to considerable fluctuations associated with reconstruction and re-equipment needs, and to changes which may take place in the balance between the various steel products. (2) Possibilities of production depend upon the practical fulfilment of the equipment programs now envisaged, the evolution of technique and, above all, the resources of raw materials available.

In its summary, the committee asserts that full use can be made of existing capacity only if:

1—There is an increase of over 50 pct over 1947 in the supplies of coke.

2—Imports of scrap or pig iron can be obtained from the U. S.

3—There is a substantial increase in imports of American semifinished steel.

If the coke deficit is not eliminated, the report states, "requests for American steel or pig iron in 1948 will be increased in the proportion of 1.2 million tons for each million tons of coke."

Estimating that there "might be an over-all shortfall of steel production in 1951 of 3 or 4 million tons," the Steel Committee states it "does not feel that the possible shortfall is either considerably or readily measures," adding that "it is wise to state the program from America in 1951 on the basis of the full achievement of the European production programs, notwithstanding the limited risks which this entails."

Import Requirements of Participating Countries and Western Germany from Non-participating Countries, including the Americas

(Thousands of metric tons. Millions of U. S. dollars)

	1948		1949		1950		1951	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Crude and semi-finished steel (actual weight)	2,490	157	2,540	160	2,700	170	2,620	165
Finished steel, other than sheets and tinplate	596	55	69	6	—	—	—	—
Sheets	385	60	180	28	31	5	—	—
Tinplate	291	47	285	46	269	43	250	40
Rich iron ore	2,480	15	2,490	15	3,300	20	3,400	21
Manganese ore	648	10	776	12	841	13	921	15
Ferro-manganese	60	7	73	9	83	10	88	11
Scrap (or pig-iron equivalent)	1,514	55	1,878	68	2,206	80	2,346	85
Pig iron	193	7	79	3	—	—	—	—
Plant and equipment	—	100	—	100	—	100	—	100
TOTAL	—	513	—	447	—	441	—	437

British Steel Quota Set; Scrap Shortage Is Biggest Problem

London

• • • **The Cabinet has** set the British iron and steel industry the task of producing 14 million ingot tons of steel and an increased output of iron castings in 1948. This is a major part of the plan for Britain's recovery. British steel production reached that level during the third week of October for the first time in many months. In the British iron and steel industry the last quarter of the year is seasonally a high production period.

The target can be achieved in 1948 but only if sufficient scrap is made available to the industry. Even before the war, home scrap supplies were about 1 million tons a year below the level required. In those days the deficiency was made good from overseas sources, chiefly the U. S.

Germany is at the moment the only practicable source of important overseas supplies. Reserves of scrap available in various forms in Great Britain were largely exhausted during the war.

The iron and steel industry's stocks of scrap are now precariously low and a "hurry" call over the signatures of the presidents of the British Iron and Steel Federation, the Joint Iron Council and the National Federation of Scrap Iron and Metal Merchants has been sent out to all users of iron and steel, emphasizing that an increase in scrap supplies must come at once if the production target is to be attained. Holders are asked to send to their scrap merchant every ton of iron and steel in workshop or yard for which there is no immediate use.

Members Chosen For National Industrial Conference Board

New York

• • • **Twenty-one New York** executives were elected or re-elected as board members of the National Industrial Conference Board for 1-year terms at the 290th meeting of the conference board.

Victor Emanuel, chairman of the board, AVCO Mfg. Corp., and Alexander E. Patterson, president, Mutual Life Insurance Co., were elected board members.

Philip Cortney, president, Coty, Inc.; James F. Fogarty, chairman, executive & finance committee, North American Co.; George M. Gillies, Jr., president, Adams Express Co.; William J. Graham, vice-president, Equitable Life Assurance Society; Rolland J. Hamilton, secretary & treasurer, American Radiator & Standard Sanitary Corp.; R. A. Hummel, president-general manager, Lone Star Cement Corp.

Also Austin S. Igleheart, president, General Foods Corp.; Kingsley Kunhardt, vice-president, Guaranty Trust Co.; Edward F. McGrady, vice-president, Radio Corp. of America; George W. Merck, president, Merck & Co., Inc.; Gustav Metzman, president, New York Central R.R. Co.; Irving S. Olds, chairman of the board, U. S. Steel Corp.

Also Dr. John C. Parker, vice-president, Consolidated Edison Co., Inc.; Bernard Peyton, vice-president and treasurer, New York Air Brake Co.; Auguste G. Pratt, president, Babcock & Wilcox Co.; Henry S. Sturgis, vice-president, First National Bank of the City of New York; L. A. Van Bomel, president, National Dairy Products Corp.; Harry E. Ward, chairman of the board, Irving Trust Co.; and Langbourne M. Williams, Jr., president, Freeport Sulphur Co., were reelected board members.

The conference board, founded in 1916, is an independent and nonprofit institution for research and education in the fields of economics and business. Its work is supported by nearly 3000 business concerns, trade associations, labor unions, government bureaus, libraries, colleges and universities. Members who are elected on the basis of their interest in the research and conference work of the board constitute a relatively small but distinguished group of men active in business, public, or educational affairs.

Harvester Co. Opens New Manufacturing Research Division

Chicago

• • • **International Harvester** Co. played host to the press recently when almost 100 guests inspected the new manufacturing research department of the company in Chicago. Well coordinated tours of all the research facilities were featured. The Harvester representatives and specialists explained the function of the different departments and the machines which cover fields of chemical and physical testing, induction hardening, metallograhy, micrography, x-ray, spectrographic analysis, surface finish, heat treating, shot peening and all the related branches of industrial research.

Mr. J. L. McCaffery, president, in a brief talk said that the broad program of manufacturing research as planned by International Harvester was threefold:

"(1) To study and conduct research concerning technical manufacturing activity of all kinds; to assure Harvester that it is in close touch with technical progress and all developments which flow from the efforts of scientists, engineers and practical factory men in this country and throughout the world.

(2) To formulate standards of manufacturing practices to be followed by the company's various divisional manufacturing departments.

(3) To conduct manufacturing operations research directed toward continual study and improvement of the organization of Harvester manufacturing activities."

It is estimated by Harvester officials that around $3½ million will be expended to complete the equipment and research facilities of the new division.

Gets Gas Station Order

Pittsburgh

• • • **Chemical Plants Div.,** of Blaw-Knox Co., has received a contract from the United Natural Gas Co., Oil City, Pa., for the erection of a compressor station near Ellwood City. The new station will have seven compressors.

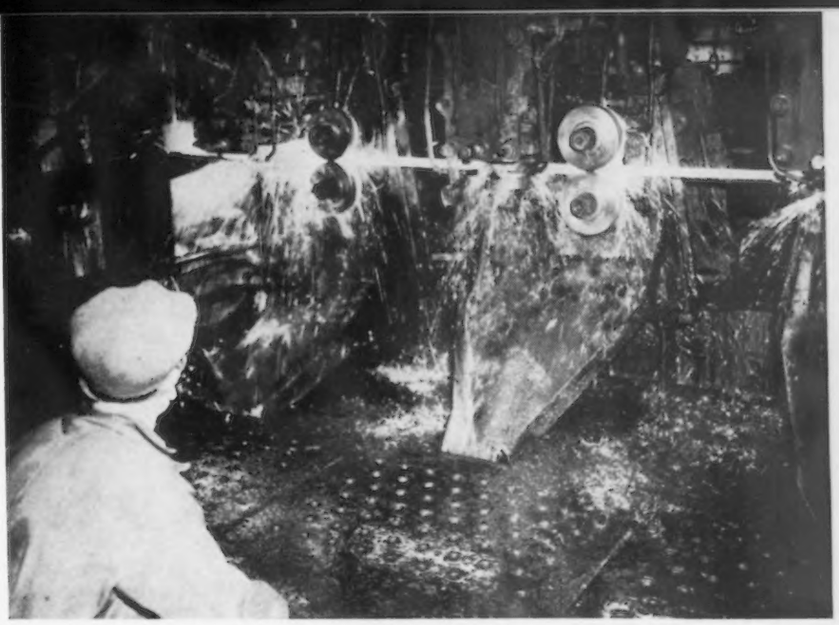
Blast Furnace Capacity and Production—Net Tons

	Number of Companies	Annual Blast Furnace Capacity	PRODUCTION							
			PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL			
									Pct of Capacity	
			September	Year to Date	September	Year to Date	September	Year to Date	Sept.	Year to Date
DISTRIBUTION BY DISTRICTS:										
Eastern	11	12,551,280	904,712	8,108,178	33,352	240,659	938,064	8,348,837	91.0	88.9
Pittsburgh-Youngstown	17	25,042,040	1,789,428	16,952,455	18,420	142,773	1,807,848	17,095,228	87.9	91.3
Cleveland-Detroit	6	6,557,500	468,947	4,342,558	.....	.....	468,947	4,342,558	87.1	88.5
Chicago	7	14,097,710	1,068,885	9,356,791	.....	.....	1,068,885	9,356,791	92.4	88.7
Southern	8	4,924,670	319,443	2,890,566	8,684	84,836	328,127	2,975,402	81.2	80.8
Western	4	2,536,000	188,749	1,657,481	.....	11,297	188,749	1,668,778	90.7	88.0
Total	37	65,709,200	4,740,164	43,308,029	60,456	479,565	4,800,620	43,787,594	89.0	89.1

Source: American Iron & Steel Institute

Australian Steel Is Made At Newcastle

• • • Steel works opened at Newcastle, New South Wales, in 1915, proved to be the modern foundation of "Australia's Birmingham." In addition to general, stainless, and alloy steel industries, Newcastle has wire, nail, tube, and galvanized iron plants. About 200 miles north of Sydney, Newcastle has a fine harbor and dockyard, and is the outlet for the rich primary production of the Hunter River Valley.



• *Pictured above is hot steel emerging from the end of a furnace and being formed into pipes in a butt welding plant at Newcastle. Since* 1934 *manufacture of all kinds of steel tubing and of tube installations has been carried out by Stewart and Lloys Pty. Ltd. The industry employs* 2500 *at Newcastle, the total population of which is now* 140,000.

ABOVE

• *The Broken Hill Pty. steel works employs about* 7000 *directly, and has an annual production capacity of* 1,000,000 *tons of first quality steel. The picture above shows workers striking a sample of steel taken from an openhearth furnace in order to determine whether or not the furnace is ready for tapping.*

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RIGHT

• *The coal bridge, at right, lifts the coal trucks off their bogies and conveys the coal to the dump, from which it is removed to feed the hungry furnaces of the steelworks.*

Industrial Briefs . . .

• AUCTION—Plant and equipment of the Rayfield Industries, Inc., West Springfield, Mass., have been sold at auction. A realty firm bought the plant and various interests acquired the machine tool equipment.

• ELECTS PRESIDENT — Pacific Northwest chapter of the Institute of Scrap Iron & Steel Inc., has elected N. Nichelson, Riverside Junk Co., Inc., Everett, Wash., president.

• AUSTRALIAN OUTLET—American Engineering Co. of Philadelphia, subsidiary of Hayes Mfg. Corp., has just licensed John Thompson Pty. Ltd., of Melbourne, Australia, to build and market its stokers in that country.

• FORMS ALUMINUM CO.—R. E. Lukens, president of the Central Tool & Die Co., has announced the creation of the Lukens Aluminum Co. of Dayton. This aluminum alloy die casting plant is headed by W. B. Kindrick as general manager.

• COPPERWELD ENTERTAINS — Copperweld Steel Co. of Glassport, Pa., was host to about 8000 visitors at a recent open house.

• SALES AGENTS—Appointment of Crawford-Mazer, Inc., Detroit, as sales agents for all Hussey copper and brass products in the Detroit territory has been announced by C. G. Hussey & Co., Pittsburgh.

• BUILDS NEW PLANT—Shanafelt Mfg. Co., manufacturers of foundry products, has recently completed the moving of their entire operations to their new plant at 2623 Winfield Way N. E., Canton, Ohio.

• EMPLOYEE OWNERSHIP — Camp Mfg. Co. of Tacoma, Wash., platers of aluminum, have worked out a plan whereby all the employees will become stockholders.

• CELEBRATES CENTENNIAL — International Harvester recently celebrated 100 years of operation in Chicago. An exposition at Soldiers Field displayed approximately 275 machines valued at $500,000, representative of the types of equipment the company makes.

• MOVES—The Steel Joist Institute has recently moved to the Ring Bldg., 1200 18th St., N.W., Washington 6.

• OPENS CANADIAN OFFICE—Syntron Co. of Homer City, Pa., has announced the establishment of a branch sales office in Montreal at 4695 Sherbrooke St., W., under the supervision of Mr. C. F. A. Gray.

• CHANGES NAME—The Lead-All Products Co., New York, has changed its name to Rumac Mfg. Co. They are manufacturers of stripping machines, screw drivers and extension shafts.

• NEW PLANT—A long term lease on a new factory building in Stratford, Conn., has been signed by Manning, Maxwell & Moore, Inc. Production of the company's Ashcroft gauge line, now manufactured at the Bridgeport plant, will be moved to Stratford.

• EXPENDITURE PROGRAM—Union Pacific R. R., Boise, Idaho, has authorized the expenditure of $67 million for new equipment and stationary facilities. This money is in addition to the more than $100 million already authorized for a long range postwar rebuilding program.

• SILVER JUBILEE—The twenty-fifth anniversary of Electro-Motive Div. of General Motors, at LaGrange, Ill., was celebrated recently. Tribute was paid to H. L. Hamilton who founded that organization.

More Allocations Of Tin Increase U. S. Share by 7143 Tons

Washington

• • • **Additional allocation** of 7143 long tons of tin by the Combined Tin Committee to the United States raises the total U. S. allocations for the final half of 1947 to 21,800 tons.

Total new allocations were 11,085 long tons. These were in addition to allocations of 11,331 tons on July 8; 15,710 tons on Aug. 21, and 731 tons approved since the last formal meeting of the committee. Total allocations to date aggregate 38,857 tons.

These will be the final last half allocations for most countries although provision has been made for small amounts to certain countries, pending clarification of last half requirements.

It was stated by the committee that the final allocations are slightly higher than had been forecast in August because of an increase in production from exporting countries.

Detailed allocations, by country and by tonnage, are as follows:

Country	Total of Allocations previously approved for the second half of 1947	New allocations announced Oct. 30, 1947	Total Allocations for the Second Half of 1947
	(Long Tons)		
Argentina	—	75	75
Australia	425	100	525
Austria	97	51	148
Brazil	100	—	100
Canada	1,000	525	1,525
Ceylon	26	22	48
Chile	49	—	49
Czechoslovakia	508	224	732
Denmark	165	60	225
Egypt	110	40	150
Finland	72	31	103
France	4,115	1,210	5,325
Germany	1	99	100
Hong Kong	52	61	113
Hungary	203	—	203
India	3,263	651	3,914
Ireland	25	5	30
Italy	657	—	657
Newfoundland	5	—	5
New Zealand	296	80	376
Norway	141	51	192
Palestine	82	31	113
Philippines	4	14	18
Poland	241	197	438
Sweden	493	200	693
Switzerland	522	—	522
Turkey	186	74	260
U.S.A.	14,657	7,143	21,800
Uruguay	41	4	45
Yugoslavia	116	57	173
Others	120	80	200
Total	27,772	11,085	38,857

Nourse Report Says U. S. Economy Can Stand Foreign Aid

Washington

• • • **The American domestic** economy and financial resources are well able to stand the proposed new foreign aid program but some form of control must be exercised over the use of key items such as steel and machinery in order that the most urgent needs, both at home and abroad, may be equitably supplied. Europe must have steel, even if exports to other countries might have to be reduced.

Recognizing the serious raw material shortages in the American steel industry and particularly the pressing steelmaking scrap shortage, the report states that it considers the possibility of shipping scrap abroad under the Marshall Plan as "illogical."

This is the substance of the Nourse report, a study by the President's economic advisers, made public last week by the White House. It was the second of three reports of which one, the Krug report (THE IRON AGE, Oct. 23, p. 72), already has been released.

"Aided by these reports and other pertinent material, I shall make recommendations to the Congress concerning a program of foreign assistance," President Truman said.

The Council of Economic Advisers, headed by Dr. Edwin G. Nourse, does not feel that steel exports have had any appreciable bearing on either price increases or upon domestic shortages. Prices of steel, the report said, are a matter of business policy based upon a need for a reasonable profit return rather than upon shortages, of the moment.

As for shortages, it was added, the most important factor is the increased domestic demand in face of the industry's "conservative program" for expansion rather than increased exports. Production has been further cramped by shortages of coke, scrap, pig iron and transportation facilities.

"Forces not related primarily to foreign trade induced important price rises for coal and steel, which in turn gave impetus to price increases elsewhere," the report said. "Furthermore, when the price declines which were anticipated earlier did not materialize, the effect was to bring into the market the buyers who had postponed buying.

"While it is clear that we would have had more steel available for domestic use if we had exported less, the shortages of steel in this country to date have been due mainly to a lag in the steel industry's output in comparison with the present size and character of our national economy."

Recognizing that there is little prospect of increasing capacity in time to affect 1947 or 1948 and that diversion of steel for substantial capacity expansion would only "accentuate the current shortages," it was stated that "the immediate problem is directing the steel supply to most urgent uses both at home and abroad."

It was noted that only 27 pct of total steel exports (dollar value) went to Europe during 1946 and the earlier months of 1947. Under the Paris Report, estimated import requirements of the participating countries are placed at about 3.1 million short tons annually for steel ingot or ingot equivalent for the next four years. This placed their maximum demand at less than 4 pct of current American production, as compared with 2.8 pct recently.

Using Dept. of Commerce figures, the study found that the annual rate of export of rolled steel products was almost three times as great in the first half of 1947 as for 1929, and that the percent of total production exported was more than twice as great. Nevertheless, the report stated, due to the great increase in domestic production, the amount available for domestic use

50 YEARS AGO

THE IRON AGE, *October 28, 1897*

• "The problem of how to make available for transportation to distant furnaces, lower grade magnetic ores which accompany bodies worked at a number of points in New York, New Jersey and Eastern Pennsylvania, has been worked on for a number of years by Thomas A. Edison and other inventors who are developing the idea of magnetic concentration. With unflinching courage, Mr. Edison and his associates have devoted their means to the undertaking. Mr. Edison himself has contributed three fourths of the $2 million which have been spent in exploration, development, construction and equipment."

• *"The Swiss National Council has adopted a bill making insurance against illness compulsory in the case of all persons not having independent means."*

• **"Before the Supreme Court Rapid Transit Commissioners of New York City, Emil Swensson of Carnegie Illinois Steel Co. testified that the company is willing to deliver all the structural work for the New York subway at any number of points along the line for $50 per ton. For $6 or $7 a ton more, the company will be willing to put this work in place, forming the completed road structure."**

• SAN FRANCISCO — "The exchanges at the Clearing House for the past 2 weeks have been almost 50 pct larger than this time last year. Results of the heavy sales of produce are seen as increasing demand every day for articles."

• **"The coroner's jury at Hazleton, Pa., which investigated the death of the striking miners by the hands of the sheriff's deputies at Lattimer, Pa., in September, rendered a verdict blaming the sheriff and stated that the killing was unnecessary."**

was at an annual rate about 27 pct higher during the first half of 1947 than in 1929 and about 72 pct higher than for the last prewar year.

A warning was voiced that continued shortages might result in further steel price increases which would have a chain reaction by forcing increased prices in other products. The danger is particularly acute should the steel industry yield to pressure for further wage increases and pass the increased cost on to consumers, it was said.

Inflationary threats springing from the steel situation are not confined to higher steel prices; the lack of steel tends to create shortages in steel-using industries where shortages are price factors. Also, foreign demands for machinery and equipment adds to these pressures.

In this field, freight cars, gondolas, mining and electrical machinery and equipment, and specified agricultural equipment are among urgent European equipment needed. These are needed to break European production bottlenecks and help get the continent back on a more self-sustaining basis.

At present levels of production, it is not seen as possible to meet export demands for agricultural machinery "without slowing down somewhat both the removal of transport bottlenecks and the improved mechanization of agriculture." In other fields, such as electrical machinery, meeting export requirements may accentuate some shortages and add to inflationary pressure at some points. However, in general, the Council does not anticipate that the exports of machinery and equipment will cau-e a serious disruption to industry as a whole.

Corrosion Men to Convene

New York

• • • **The fourth annual** conference and exhibition of the National Assn. of Corrosion Engineers will be held Apr. 5-8, 1948, at St. Louis. The program will include symposia on cathodic protection, protective coatings for metals and salt water corrosion. The exhibition will show the latest in equipment, material and methods for combating corrosion.

Construction Steel . . .

• • • **Fabricated steel awards** this week included the following:

1500 Tons, Philadelphia, hangars for Southwest Airport, City of Philadelphia, to Bethlehem Steel Co., Bethlehem.

910 Tons, Vermillion County, Ill., truss span section 34-Z-F previously reported, awarded to Illinois Steel Bridge Co., Jacksonville, Ill. Erection will be done by Clinton Bridge Co.

225 Tons, Cambridge, Mass., super market for S. S. Eustis Co., Inc., Boston, to West End Iron Works, Cambridge, through White Construction Co., Boston, general contractor.

175 Tons, Harrisburg, Pa., warehouse for M. Brenner & Sons to Reading Steel Products Co., Reading, Pa.

170 Tons, Philadelphia, 70th St. bridge, City of Philadelphia, to American Bridge Co., Pittsburgh.

140 Tons, Jefferson County, Wis., State Highway Dept. FAS 0442-1 to American Bridge Co., Pittsburgh.

135 Tons, Ozaukee, Wis., project F-049-1 bridge to Worden-Allen Co., Milwaukee.

100 Tons, Philadelphia, Walnut Lane bridge, City of Philadelphia, bids rejected.

• • • **Fabricated steel inquiries** this week included the following:

1200 Tons, St. Paul, parts plant for International Harvester Co., Chicago.

1000 Tons, Chicago, board of education, elementary and high school building. Bids closed Oct. 29.

900 Tons, Allegheny County, Pa., bridges for airport parkway, Allegheny County Highway Dept., Nov. 28.

500 Tons, Kokomo, Ind., mill building extension for Continental Steel Co. Bids closed Oct. 30.

425 Tons, Grasselli, N. J., building extension, General Aniline & Film Corp., due Nov. 12.

150 Tons, Philadelphia, human centrifuge building for Navy Yard, U. S. Navy, due Nov. 20.

• • • **Reinforcing bar awards** this week included the following:

105 Tons, Minneapolis, highway laboratory for State of Minnesota, Steenberg Construction Co., low bidder.

100 Tons, Peabody, Mass., city municipal power plant to Truscon Steel Co. through M. Spinelli & Sons Inc., Boston, general contractors.

• • • **Reinforcing bar inquiries** this week included the following:

400 Tons, South Carrollton, Ky., Green River power house for the Kentucky Utility Co.

• • • **Plate inquiries** this week included the following:

100 Tons, Lansdale, Pa., standpipe, Lansdale Municipal Authority, due Nov. 12.

• • • **Railroad inquiries** this week included the following:

The Chesapeake & Ohio Ry. has been authorized the purchase of 45 new locomotives and 200 automobile cars.

Crucible Steel Reports Quarterly Income Lower

New York

• • • **A statement of the** earnings of Crucible Steel Co. of America and subsidiary companies for the third quarter of this year shows a marked decline from figures covering a similar period last year.

Net income before provision for income taxes for the third quarter of this year was $91,375, while the figure for the similar period last year was $467,619. The net income after provision for income taxes for the third quarter of this year is reported at $23,639, as compared with $251,436 reported for the third quarter of last year.

Little Change Expected

South Bend

• • • **Studebaker will** join in November the growing list of independent producers who will bring out new 1948 models this year.

Although details of the new line are being kept under wraps, the fact that no loss in production is anticipated would indicate that many of the basic lines of the present unique Studebaker styling will be retained.

It will be recalled that in May 1946 Studebaker introduced the first postwar car with some of the most revolutionary styling changes the industry had seen for many years. The new 1948 model is the first change in Studebaker models since that time.

Announce New Brake For Stopping Railway Cars

Philadelphia

• • • **After 10 years of** research and development, The Budd Co. has announced perfection of a new railroad disc brake. The company says its new model CF disc brake will stop a railway passenger car without discomfort to passengers from 60 miles an hr in less than 1000 ft; from 80 miles an hr in less than 1600 ft and from 100 miles per hr in less than 2500 ft.

Budd's disc brake is described as a friction machine in which stationary asbestos-lined shoes grip both sides of a revolving disc attached to the axle. This disc has numerous internal fins which dissipate the heat rapidly and keep the disc and the shoes cool.

FTC Study Reveals Industrial Profits Dropped During War Years

Washington

• • • **A recently completed** Federal Trade Commission study of industry cost-profit data hands a jolt to those who have charged that wartime production returned unusual industry-wide profits to corporations and other private enterprise. Instead, the study reveals, net profits for most industries after taxes during the 4-year period were considerably less than for the immediate prewar period.

Profits of the iron and steel industry, for example, were found to be only half as much in 1945 as during the last prewar year. Using 1941 for its base (100), iron and steel corporation profits after taxes dropped to 49 by 1945.

Iron and Steel Profits Were Half As Much In 1945 As In Last Prewar Year

o o o

By KARL RANNELLS
Washington Bureau

o o o

The nonferrous metals industry fared but little better; its profits after taxes decreased to 52 in the index, according to the study.

Charges by labor and various economists notwithstanding, the FTC study reveals that the big steel corporations—that is, those having assets of $10 million or more each—did not fatten their pocketbooks on war production. On the contrary, these were the companies hardest hit. Despite the fact that sales costs dwindled as war demands increased, there was a steady decline on the profit side of big company ledgers which reached two points below the industry average.

Small producers—those whose assets were $1 million or less—fared somewhat better. However,

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PROFIT PICTURE: *The accompanying chart shows only a section (iron and steel industries) of a comprehensive cost-profit study by the Federal Trade Commission. Using the year* 1941 *for a base* (100), *net profits for iron and steel producers of all sizes dropped to* 49 *in* 1945. *The FTC figures also indicate that the small enterprises fared better than the large ones.*

o o o

Industry	$\frac{1}{4}$ - 1 Million Assets				$1 - 5 Million				$5 - 10 Million				$10 Million and over				Total all asset sizes			
	'45	'44	'43	'42	'45	'44	'43	'42	'45	'44	'43	'42	'45	'44	'43	'42	'45	'44	'43	'42
Net Sales, 1941 as 100																				
Iron & Steel	126	140	135	120	131	143	139	120	137	146	152	133	115	120	116	109	122	129	126	115
Nonferrous metals	133	144	141	122	118	138	139	116	167	164	149	120	103	112	114	105	119	128	126	111
Net Income Before Taxes, 1941 as 100																				
Iron & Steel	84	133	146	148	69	117	129	131	70	103	141	146	49	71	94	109	59	89	112	122
Nonferrous metals	105	136	151	127	75	111	131	114	36	134	147	117	47	90	102	97	56	103	116	104
Net Income After Taxes, 1941 as 100																				
Iron & Steel	56	79	84	91	52	76	78	88	55	73	93	107	47	57	67	77	49	64	74	84
Nonferrous metals	64	78	93	88	60	76	90	82	19	94	98	83	55	77	88	80	52	79	90	81
Total Assets Based on 1941 as 100																				
Iron & Steel	124	133	132	123	119	130	131	119	120	146	151	142	97	102	105	105	104	111	114	111
Nonferrous metals	131	134	129	118	126	134	134	121	155	132	130	121	103	116	116	110	115	122	122	114

Industry	$\frac{1}{4}$ - 1 Million Assets		$1 - 5 Million		$5 - 10 Million		$10 Million and over		Average all Groups		
	Report	BIR	Report	BIR	Report	BIR	Report	BIR	Report	BIR	
Net Income, Before Taxes, per Sales Dollar, 1941											
Iron & Steel	12.0%	11.9%	14.4%	14.9%	17.8%	17.7%	14.1%	12.9%	14.2%	13.5%	
Nonferrous metals	9.2	9.4	12.7	11.1	7.3	8.7	11.6	17.1	11.1	14.2	

their net profits after taxes were only 9 pct better than the $10-million group and 7 pct above the index figure for the industry as a whole. Contributing to this relatively better position of the smaller concerns was the fact that demand for war production caused their sales to increase by one-half.

The FTC report represents completion of a study which was started by the now defunct OPA, based on statistics compiled from the control agency's Form A. An executive order turned the work over to the Commission when OPA was terminated.

The full report is based on study of costs and profits of 4107 identical companies, involving 22 industry groups, whose reports for the 1941-45 period consistently provided usable information for the purpose. Accuracy of the reports were certified by company officials. Only those firms with assets of $250,000 or more were included in the study.

Information on the iron and steel industry was garnered from operating reports from 591 different firms; these were found to comprise 44 pct of the total firms listed by the Bureau of Internal Revenue and to hold 36 pct of the industry's assets as recorded by the same source.

It was brought out that, while sales and administrative costs decreased, there was a continuous rise in manufacturing and materials cost during the war period.

Prewar costs ranged from 63.3¢ out of every sales dollar for "miscellaneous manufactures" to a maximum of 85.2¢ for transportation equipment; by 1945, costs ranged from a minimum of 66.3¢ for printing industries to a maximum of 89.5¢ for transportation equipment manufacture.

In the iron and steel industry, figures showed, the percentage cost on goods sold rose from a prewar 78 pct to a wartime 86.2; sales and administrative expenses dropped from 7.3 to 5.9 pct. For nonferrous metals, costs rose from 83.1 to 89.3 pct; sales and administrative costs, however, showed considerable fluctuation; dropping from 6.2 pct in 1941 to 4.9 pct in 1943 and rising to 6 pct in 1945.

On the basis of the reports to OPA, it was found that the change in physical assets during the war period was relatively small in most of the 22 industries studied. Assets of the steel industry increased only 4 pct by 1945, with the $5-$10 million group showing an actual decrease of 7 pct.

Nonferrous metals gained 15 pct, however, with the greatest asset increase (131 pct) recorded in the less-than-a-million group.

The range in profit after federal taxes, per dollar of sales, for all industries ranged from 1.9¢ (foods) to 7.4¢ for the miscellaneous group.

Short Inventories Of Scrap Threaten U. S. Steel Output

Cleveland

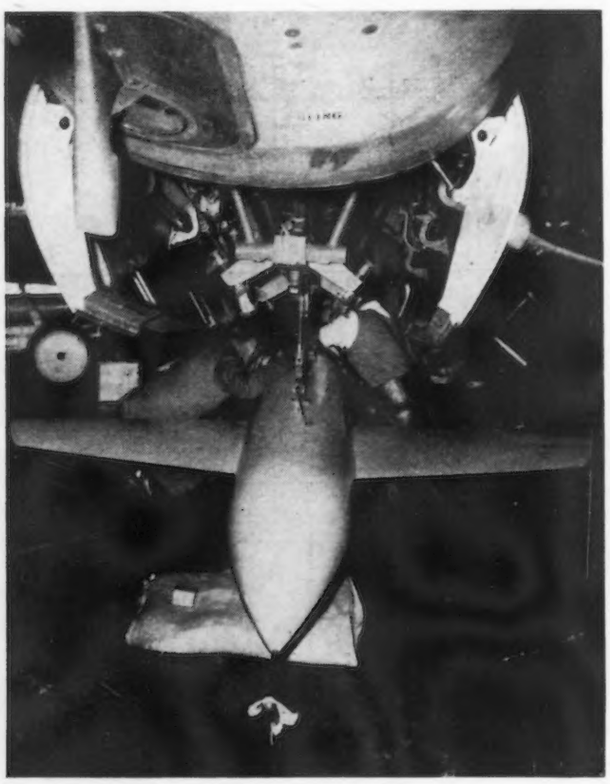
• • • **The steel industry** has been unable to operate at full capacity largely because of lack of scrap and it is doubtful that even the present rate of operation can be maintained much longer, Robert W. Wolcott, chairman of the Steel, Foundry & Scrap Industries Committee for Expediting Iron & Steel Scrap told a meeting of officials of government and industry here recently.

"Inventories of scrap recently have been lower than the minimum which was considered as the safe standard during the war. The recently issued report on world aid and U. S. capacities by Secretary of the Interior Krug declares that industry and government must cooperate to make raw materials, including scrap, available and otherwise to assure full utilization of existing capacity."

Mr. Wolcott's warning gave impetus to a joint industry-government drive to unlock stores of desperately needed iron and steel scrap required to keep the steel mills operating at high capacity.

The committee has been designated by the Army to act as an official advisory group on means of hastening the return to the nation's reservoir of scrap now held at Army installations. The Navy and War Assets Administration also are cooperating officially with the scrap committee.

Through regional subcommittees, the Steel, Foundry & Scrap Committee will attempt to uncover available and potential scrap in cooperation with the governmental agencies. L. D. Greene and Edward W. Greb will coordi-



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SHORT LIFE: *The flying life of Britain's first supersonic rocket, launched from the specially designed bomb bay of a parent Mosquito aircraft flown at 36,000 ft, was only two min. The fruits of this brief career, recorded by automatic cameras and transmitted to a base in the Scilly Islands, have not been made public.*

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CHARACTERISTICS of Michigan WELDED STEEL TUBING

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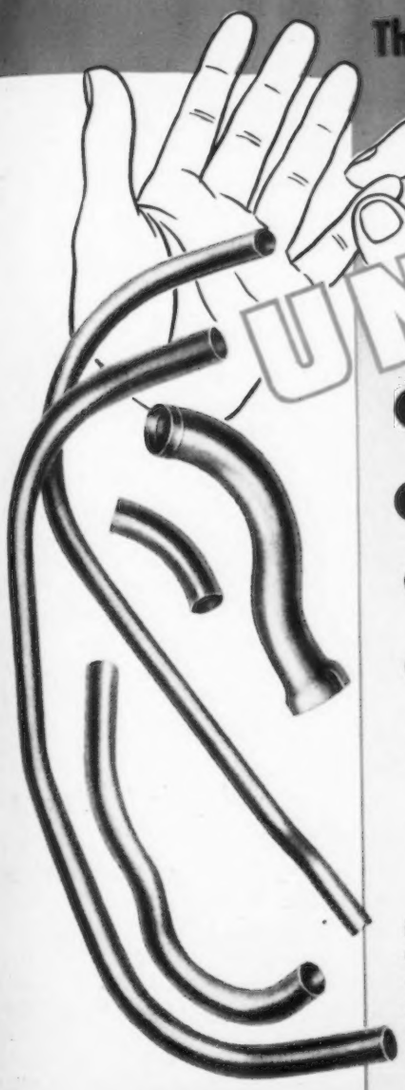

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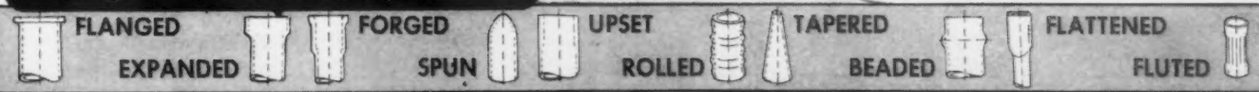

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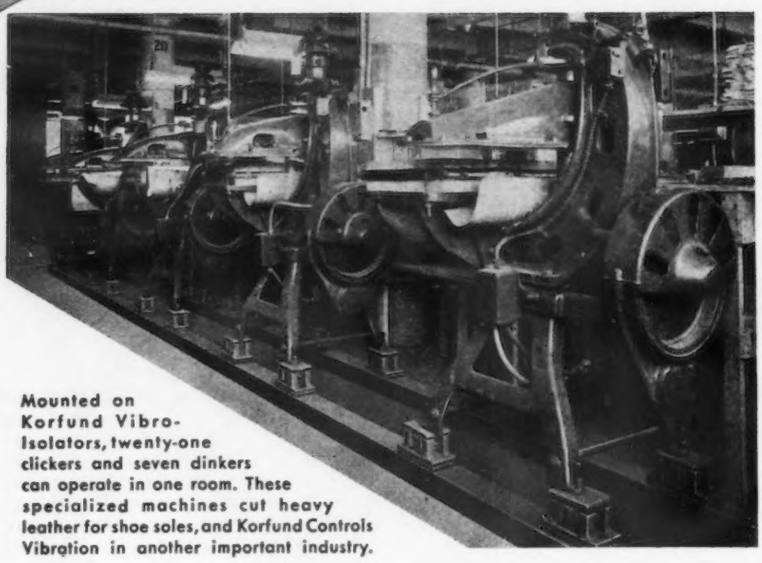
Increase PRODUCTION EFFICIENCY *with* KORFUND VIBRO-ISOLATORS



Mounted on Korfund Vibro-Isolators, twenty-one clickers and seven dinkers can operate in one room. These specialized machines cut heavy leather for shoe soles, and Korfund Controls Vibration in another important industry.

VIBRATION from any machinery in operation is a disturbance. Where machines are located close together, vibration transmitted along the line slows production, causes excessive machine wear, increases work rejections, and often damages the building structure.

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nate the work of the regional subcommittees.

Representatives of the governmental agencies spoke at the meeting and pledged fullest possible cooperation. These representatives included R. C. Turner of the executive office of the President, John Ten Eyck, War Assets Administration; Commander F. J. Roberts, Office of the Under Secretary, Dept. of the Navy; and Lt. Col. S. M. Pool, Jr., Dept. of the Army.

Mr. Turner asserted that "as long as scrap is so urgently needed in this country there will be no relaxation of the government's coordinated scrap program." He pointed out that the government's coordinated scrap disposal program will have generated by July 1948 more than 4 million tons of iron and steel scrap from July 1946.

A description of the activities and methods of the work of the San Francisco regional subcommittee was presented by N. W. Christensen, director of purchases, Columbia Steel Co., who told of the scrap potential discovered as a result of the group's efforts, and the steps it took to expedite the release of scrap. At the close of the meeting, members of the joint committee and representatives of regional subcommittees met to discuss operating methods and procedures.

A-L Backlog Is 3 Months

Pittsburgh

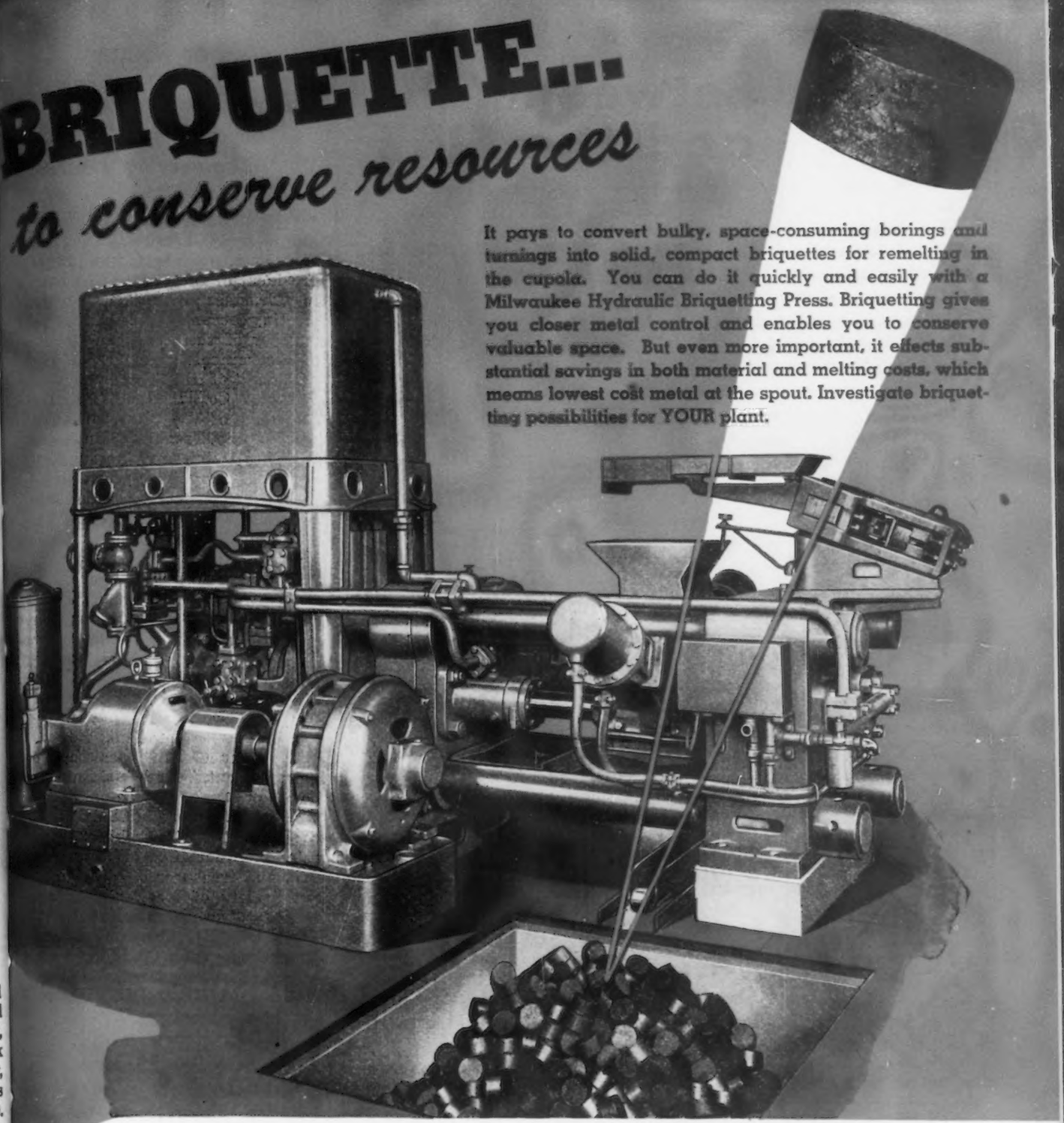
• • • **Allegheny Ludlum** Steel Corp. net earnings for the third quarter of 1947 of $1,036,332, equivalent to 80¢ per share of stock were announced by H. G. Batcheller, company president. The earnings resulted from sales of $25,934,329.

Earnings for the year to date are the same as for the corresponding period of 1946, in both instances 9 months earnings equaled $3.54 per share.

Sales were somewhat less than the $28,328,451 billed in the second quarter, Mr. Batcheller said, but, he added, this was due more to vacation shut-downs than a slackening in demand. He pointed out that the order book held a backlog equivalent to almost 3 months production and that both orders and inquiries had increased to a marked degree in recent weeks.

BRIQUETTE... to conserve resources

It pays to convert bulky, space-consuming borings and turnings into solid, compact briquettes for remelting in the cupola. You can do it quickly and easily with a Milwaukee Hydraulic Briquetting Press. Briquetting gives you closer metal control and enables you to conserve valuable space. But even more important, it effects substantial savings in both material and melting costs, which means lowest cost metal at the spout. Investigate briquetting possibilities for YOUR plant.



The Machine Pays for Itself! Briquettes produced with a Milwaukee Hydraulic Briquetting Press act like solid blocks of metal of identical size and weight. They melt readily, with practically no loss whatsoever. Aside from serving as a conservation measure, the briquetting process pays for itself in the greater amount of scrap metal salvaged from borings and turnings in the plant. Also of importance is the space and labor saving factor . . . the tremendous bulk of borings and turnings is reduced by briquetting to a uniform and convenient size for handling readily and without breakage.

Check Your Tonnage! Why not check your annual tonnage of metal borings and turnings to determine the possibility of salvaging it economically. Milwaukee engineers will gladly make available to you, for the asking, a vast store of knowledge and experience in solving your chip reclamation problems. Write today for Bulletin 117 giving complete details.

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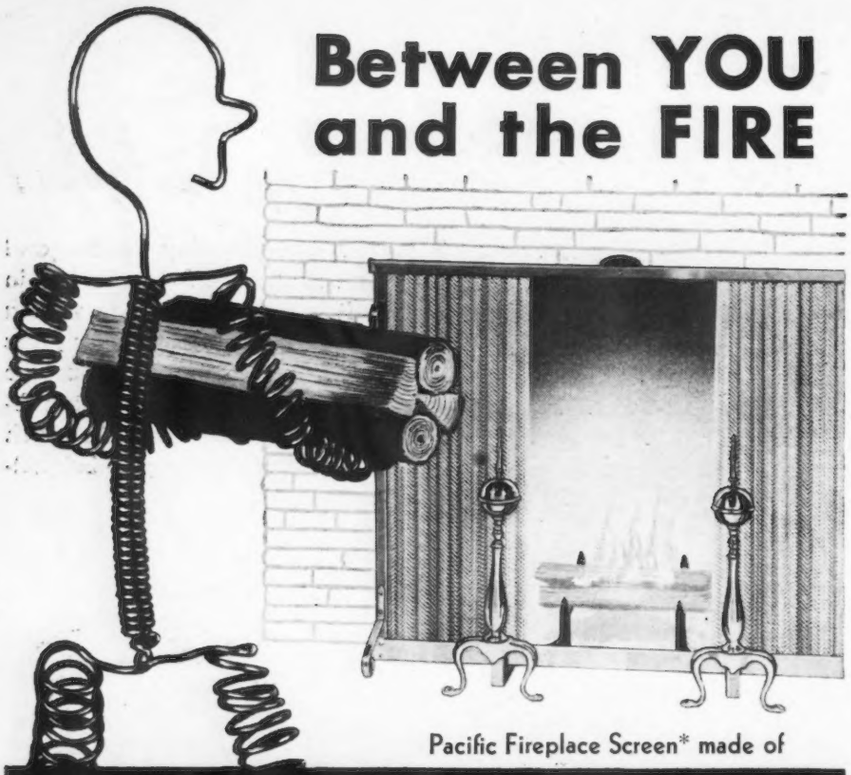
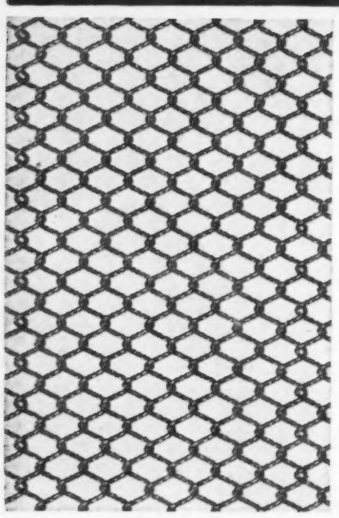


Pacific Fireplace Screen* made of

KEYSTONE WIRE



Note the fine, expert weaving of Pacific fireplace screen, requiring steel wire of highly uniform thickness and temper.

Whenever you find outstanding value in a product, you usually find plus quality in the materials used.

This is true of Pacific* fireplace fixtures — the only fireplace ensemble with andirons on the outside of screen which protects the andirons from smoke and tarnish.

Pacific screens are made of Keystone wire in beautiful *old-gold* finish. The wire is produced by a special wet-drawn process that adds lustre and smoothness. It is of extremely uniform temper — important for quality weaving.

Pacific is the largest manufacturer of fireplace screens on the West Coast. We are proud that Keystone wire meets their exacting requirements.

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Schuyler Casey Named President of United Engineering Trustees

New York

• • • **J. Schuyler Casey,** president of the M. H. Treadwell Co., Inc., New York, engineers, was elected president of the United Engineering Trustees, Inc., at its annual meeting recently. Mr. Casey, a member of the American Society of Mechanical Engineers, is also president of the Treadwell Construction Co., Midland, Pa., and chairman of the board of directors of the Treadwell Engineering Co., Easton, Pa. He succeeds J. P. H. Perry, vice-president of the Turner Construction Co., who served as president of United Engineering Trustees from 1945 to 1947.

Other officers elected were General William H. Harrison (AIEE), vice-president and chief engineer of the American Telephone & Telegraph Co., New York, and director of Procurement and Distribution Service, Office of Chief Signal Officer, Washington, re-elected as vice-president; Edward C. Meagher (AIME), assistant to the president, Texas Gulf Sulphur Co., New York, as vice-president.

Kurt W. Jappe (ASME), retired director of purchases, Hercules Powder Co., Wilmington, Del., and treasurer of the American Society of Mechanical Engineers, as treasurer, and James L. Head (AIME), Dept. of Mines, Chile Exploration Co., New York, as assistant treasurer. John H. R. Arms (AIME, ASME) was re-elected as secretary.

Earns 60¢ Per Share

Philadelphia

• • • **Mr. Charles E. Brinley,** chairman of the board of the Baldwin Locomotive Works, reported that consolidated sales of the company and its wholly owned subsidiaries for the 9 months ended Sept. 30, 1947, were $67,966,752 and that net profit for the period amounted to $1,238,918.

During the 9-month period dividends of $575,138 were received from the Midvale Co., of whose capital stock Baldwin owns 63.9 pct. After provision for preferred stock dividends the remainder of net profit was equivalent to 60¢ per share.

HARPER fastening NEWS

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ON REQUEST TO EXECUTIVES, ENGINEERS AND OTHERS INTERESTED IN FASTENINGS

The amazing new Harper Computer provides a rapid means of selecting the best non-ferrous or stainless steel alloy fastening to resist any one of numerous conditions causing corrosion. It operates on the slide rule principle and qualifies as Excellent, Good, Fair, or No Good, 13 rust and corrosion resisting metals or alloys in approximately 142 corrosive environments. To operate it, simply, select the name of the corrosive condition which most nearly matches your own. Slide this name until it is directly opposite the arrow. Look into the adjoining column for a set of symbols which indicate the non-ferrous or stainless steel alloy best suited to resist the corrosive condition in question. For example, silicon bronze may be indicated for condition A, Monel metal for condition B, etc.

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If you have a difficult corrosion problem—one not fully answered by the Harper Computer—submit it to the Harper engineers. These men are specialists in the manufacture and use of rust and corrosion resisting fastenings. They'll be glad to study your problem and suggest a solution. No obligation.

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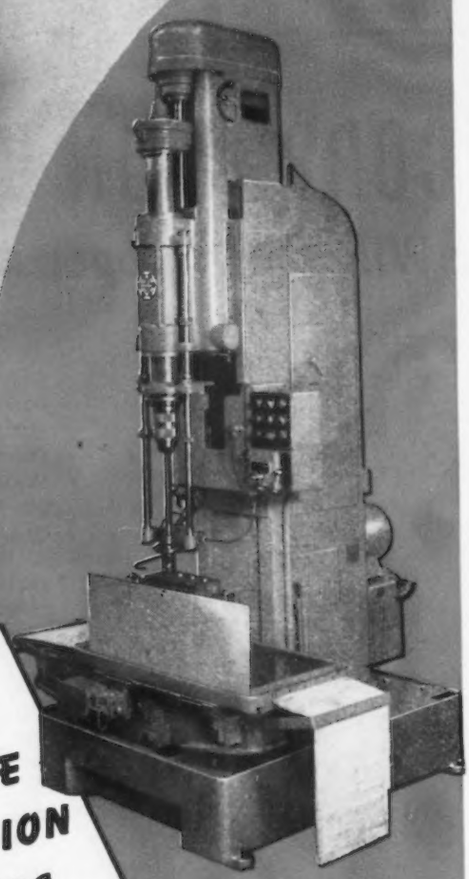
High Precision Surface Finish



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Completely automatic, electronic control of uniform size within tolerance of 0.0001 to 0.0003-inch is a production-proven feature of these new unit-assembled, hydraulically actuated, heavy-duty Hydrohoners.

With this simplified, spindle-in-quill construction torque and thrust is restricted to the centerline of the spindle—alignment is accurately maintained—weight of parts in motion is minimized—stroking speeds may be higher without increasing power input—all conventional mechanical linkages and hydraulic systems are simplified.

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Canadian Production Of Ingots and Castings Up

Toronto

• • • **Canadian production of** steel ingots and castings in August totaled 233,753 net tons or 79 pct of rated capacity, against 232,341 tons in July, or 78.6 pct, and compares with 88,729 tons in August, 1946, when two of the major steel producers were closed by strikes and the Steel Co. of Canada Ltd. was forced to cut production to less than 60 pct. Output for the month under review included 226,180 tons of steel ingots and 7,574 tons of castings.

During August charges to steel furnaces included 124,855 tons of pig iron, 67,732 tons of scrap of consumers' own make and 63,639 tons of purchased scrap.

For the eight months ending with August, cumulative production of steel ingots and castings totaled 1,949,376 net tons, as compared with 1,674,282 tons in the 1946 period and 2,049,707 tons in 1945.

Following are comparative monthly production figures in net tons:

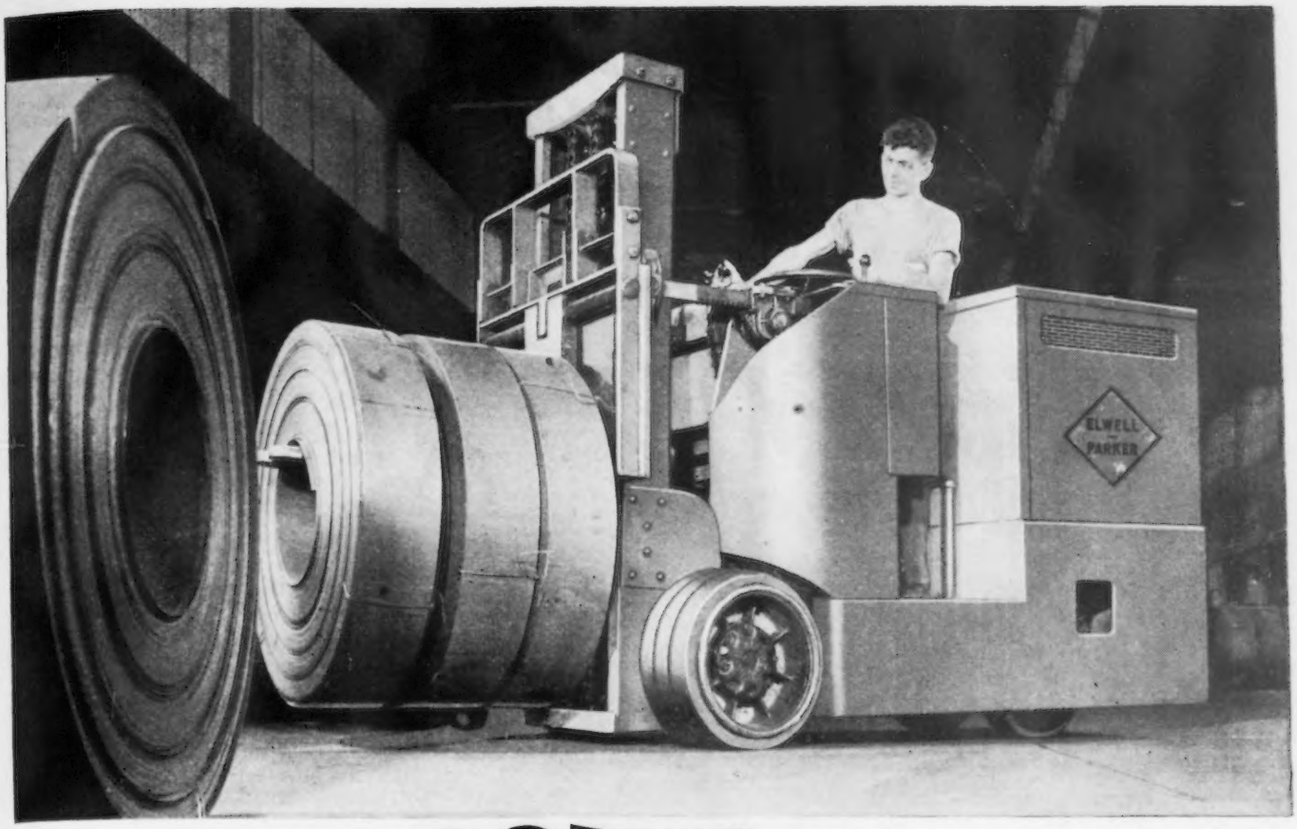
	Steel Ingots	Steel Castings
January	243,557	6,241
February	223,124	6,098
March	263,193	6,539
April	244,998	7,158
May	235,978	8,098
June	230,581	7,716
July	226,443	5,989
August	226,180	7,574
Total	1,894,054	55,322

Tucker Lets Contract

Chicago

• • • **The Tucker Corp.** has announced that it has let a contract for preparation of dies and stampings for the bodies of the new Tucker '48 to Hayes Body Co., Grand Rapids. Stampings of the body sections will be shipped to the Tucker plant in knock-down form for assembly and welding.

The Tucker Corp. hopes to start receiving the body stampings before Christmas so that a preproduction run of cars now in the process of manufacture can be completed by the first of the year. Company officials indicated that Tucker Corp. has been considering the possibilities of purchasing a steel plant to insure a steady supply of sheets for the new car.



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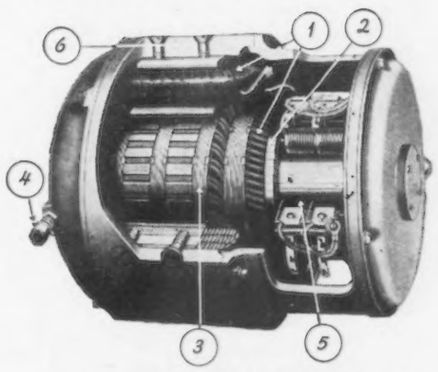
Ask your EP man for a complete account of these "plus values" in addition to the many others found only in Elwell-Parker Trucks. The Elwell-Parker Electric Company, 4525 St. Clair Avenue, Cleveland 14, Ohio.



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(1) All coils insulated with asbestos or glass.

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Material Shortages Strangle Output Of Italian Steel Works

Milan

• • • **Strangling shortages** of basic raw materials and inflated currency have combined so far to stymie most of the efforts of the Italian government to boost the output of steel and steel products in Italy.

Meanwhile the increasing demand for iron and steel in the country for use in the reconstruction of ports, railways and the shipbuilding industry, has forced an upward revision of estimated raw material needs.

In order to encourage the Italian iron and steel industry to develop its output, the government has decided to maintain controlled prices on only 60 pct of the total output, while the remaining 40 pct is now permitted to be sold on a free market. However, this measure has not proven effective, because the source of production difficulties is not to be found in the price structures. The main source of production ailments in the Italian iron and steel industry arises in the continued shortages of the raw materials so vital to the industry. The shortages which are most seriously handicapping the industry are those of coke, coal, scrap iron and ore.

The main hope of relieving the raw material shortage in the Italian iron and steel industry lies in the Marshall Plan. But so far the talks on the Marshall Plan have not proceeded to the stage where definite raw material supply commitments can be made to the Italian industry. That the Italian steel industry will receive some of the raw materials most desperately needed now seems certain, yet any attempt to estimate the future output of the industry on the basis of assistance received under the Marshall Plan would be highly speculative to say the least.

The decision of the Italian government to abolish resrictions on the investment of foreign capital in Italian industry has brought about several foreign offers of financial investment. The situation is being exploited by the Belgian and Swedish steel industries, which, in the course of the past few weeks, have opened negotia-

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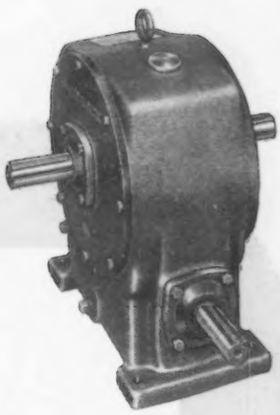
COMPLETE LINE Eberhardt-Denver WORM GEAR SPEED REDUCERS...



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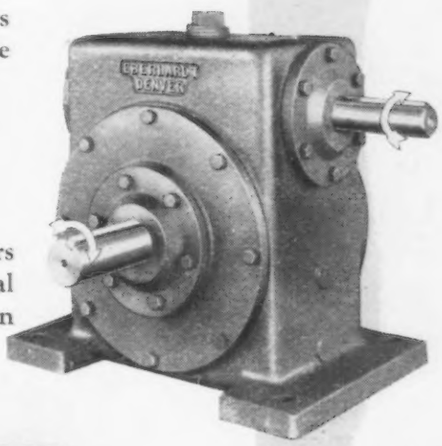
On many of your gear reduction applications you can take advantage of this standard line of small worm gear speed reducers . . . and save the time and expense of making special reduction units. These "In Stock" reducers are available in 29 models, single and double reduction, horizontal and vertical.



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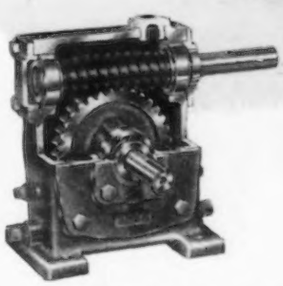
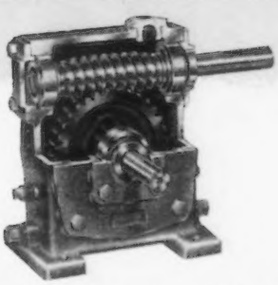
A standard line of 12 heavy duty reducers are available for prompt shipment, or special reduction units will be built to your own specifications.

QUALITY REDUCERS



Worm and shaft are integral . . . worm is hardened, ground and polished.



Worm gear is made of high grade gear bronze with generated teeth.

Worm and gear shaft are carried on Timken tapered roller bearings.

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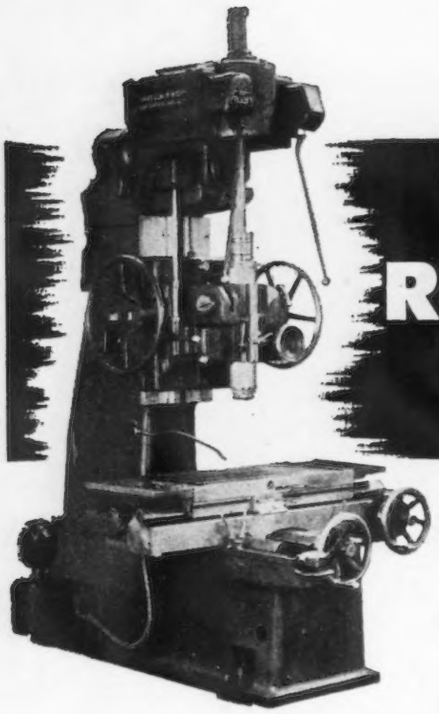

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to speed ✓ production

cut ✓ maintenance costs

give long ✓ service

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Instantaneous coolant flow, split-second control from a trickle to full volume, speeds production in your metal-cutting operations. Pre-lubricated oversized bearings, one-piece dynamically balanced shaft, no metal-to-metal contact reduces wear and assures long trouble-free service for Ruthman Gusher Coolant Pumps.

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Illustrated is a Fosdick #30 Jig Borer equipped with a 1/4 Model UL-7120 Ruthman Gusher Coolant Pump.

Ask for Catalog 10-B

THE RUTHMAN MACHINERY CO.

1821 Reading Road Cincinnati, Ohio

tions with the Italian engineering industry in an effort to barter iron and steel as an advance in capital account.

The Russian Government is attempting to barter in a somewhat different manner. It has invited an Italian economic mission to Moscow to discuss the possibility of the Italian iron and steel industry working for Russian account with Russian iron ores and coal. In connection with this plan, the Russians are counting heavily on the support of left wing parties in Italy. They are also exploiting the noteworthy unemployment in the Italian iron and steel industry, which has resulted in part from the difficulties encountered in the reconstruction of the Piombino and Porto Ferraio iron works.

A Russian technical mission has already visited the Dalmine Steel Works to ascertain the possibility of carrying out Russian orders.

Before long, Swedish shipbuilding yards may be subletting contracts to Italian yards. The Swedish yards, which have orders for ships above their capacity up to 1951, have already directed inquiries to the Italian yards as to whether the Italian yards would be willing to build some of the ships, provided the Swedish steel industry would provide the necessary metal.

The $3½ million loan which the Italian shipbuilding industry received from the Export-Import Bank will probably be spent in the U. S. if Italian shipbuilding officials are successful in negotiating an order for iron and steel with the American steel industry. The chief items being sought are cast iron, to be used in the construction of diesel machinery, and steel plates, to be used in the construction of ship's hulls.

The leading Italian iron and steel concerns, such as Ilva and Cogne, are in the hands of the government organization known as the Instituto Italiano per la Ricostruzione, which is presently unable to face even the requirements of payments of salaries to workmen. Thus the danger of strikes in the industry is very real.

The government would like to sell these industrial interests, but is afraid that such a move would provide political ammunition for the ever-alert leftist parties. Representatives of the Banque pour le

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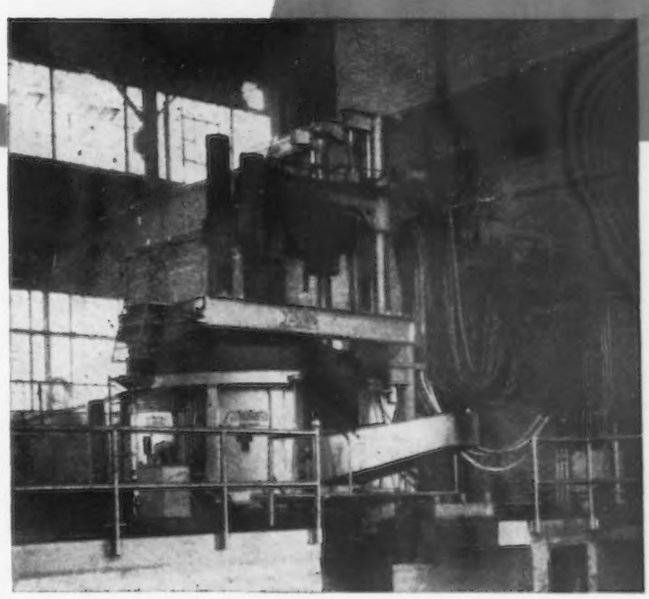
Lectromelt
FURNACES



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- Charging is faster and easier. Down time is reduced and man-hours are cut.
- Refractory life is longer, due to lessened strain.
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- Power costs decline as fuel consumption lessens.

These efficient, economical Lectromelt furnaces are available in capacities ranging from 100 tons to 250 pounds. Detailed information will be sent to you upon request.

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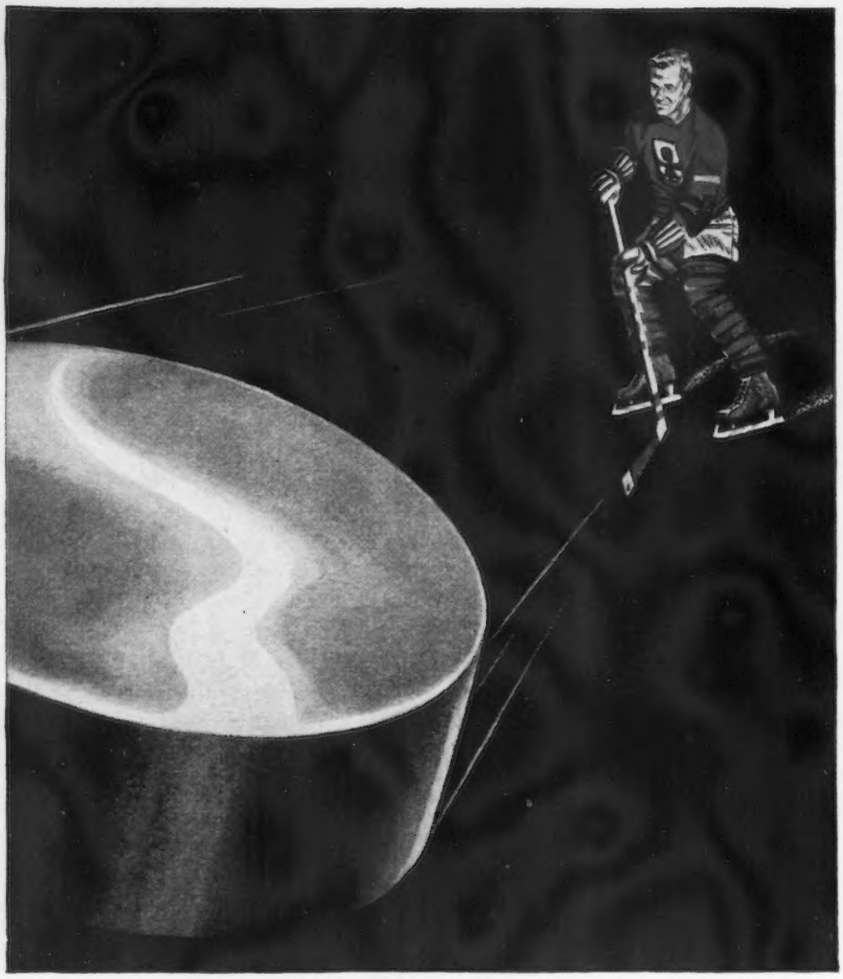
PITTSBURGH LECTROMELT FURNACE CORP.
PITTSBURGH 30, PENNA.



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PENOLA PRODUCTS HAVE MEANT EXTRA PROTECTION SINCE 1883

Commerce et l'Industrie of Paris recently journeyed to Rome to offer the Italian Government financial assistance with which to reorganize the iron and steel industry.

An agreement has already been reached whereby the Fiat steel works in Turin will receive scrap purchased from the American Zone in Germany. In return for the scrap, Italy will export semi-manufactured goods to the U. S. The Italian industry will receive additional raw materials from the U. S. as a part of this agreement.

In an effort to help relieve raw material shortages in the Italian steel industry experiments are now underway to determine the feasibility of fabricating superstructures on passenger ships from aluminum alloys. The aluminum alloys have already been employed with success by the Italian railway rolling stock industry. If successful, this experiment will release further urgently needed steel for other purposes.

In spite of the satisfactory prospects of a few months ago, a shortage of electricity is beginning to be felt in the steel industry. In an effort to offset this shortage, the industry expects to place two additional blast furnaces into production before winter. With the addition of these two furnaces, it is hoped that an average monthly output of 35,000 tons of pig iron can be reached.

But raw material shortages are expected to remain the most frustrating, as well as the most difficult, in the efforts of the industry and the government to increase steel output in Italy. The Marshall Plan remains the brightest hope for Italian industry.

Reports Quarterly Income

Birmingham

• • • **Subject to** annual audit and year-end adjustments, net income of Sloss-Sheffield Steel & Iron Co., Birmingham, for the third quarter of 1947 amounted to $480,250.95 after estimated federal income tax.

Net income after federal income tax for the 9 months ended Sept. 30, 1947 was $1,352,649.71. During the first 6 months of the year dividends amounting to $85,563 were paid on the preferred stock and dividends amounting to $248,295 were paid on the common stock.

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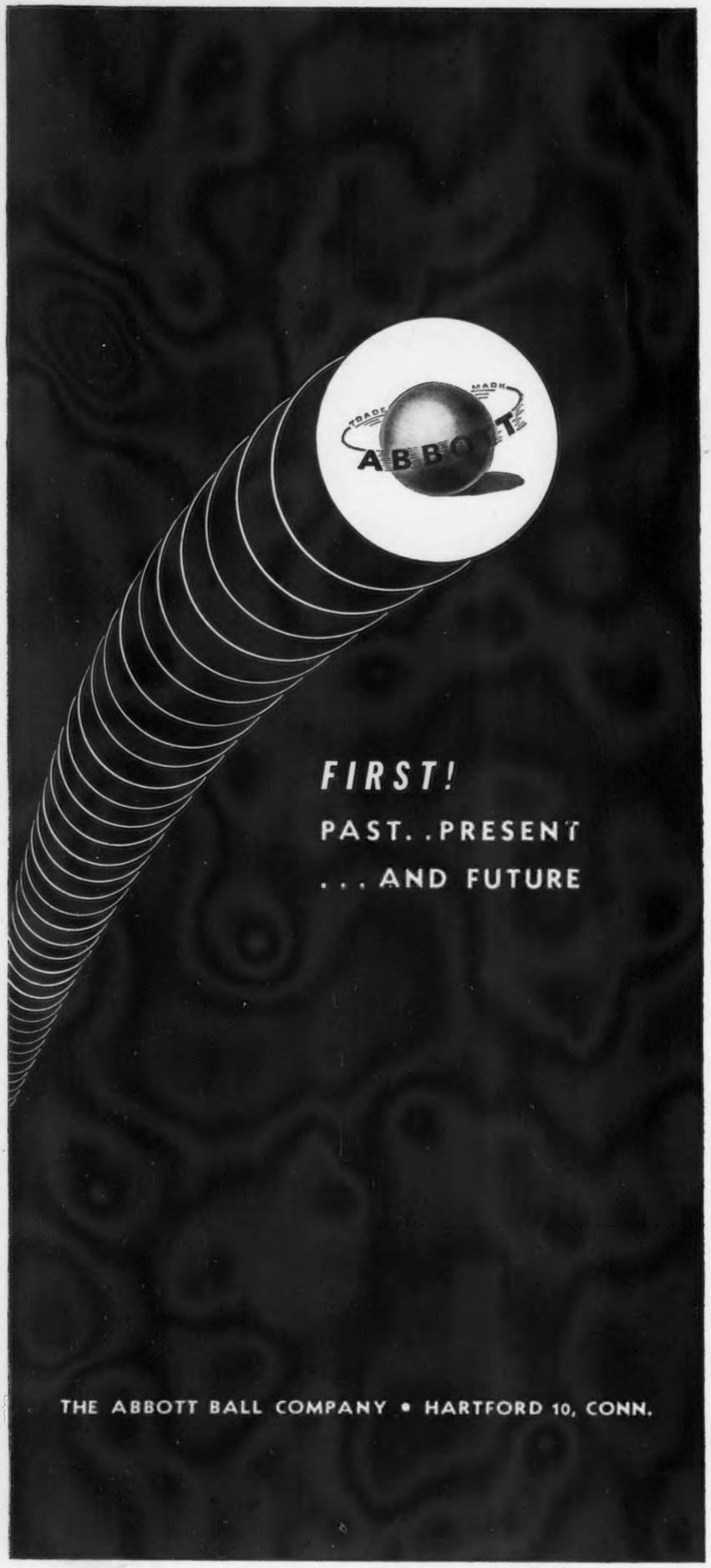


Sault Named President Metal Treating Group

New York

• • • **R. G. Sault,** vice-president of Porter Forge & Furnace, Inc., Somerville, Mass., was elected as the new president of the Metal Treating Institute at its seventeenth annual meeting held in the Graemere Hotel, Chicago, in October.

R. G. Sault

Other officers elected were: vice-president, Rowland H. Starr, Starr Heat Treating Co., Detroit; treasurer, R. W. Thorne, Bennett Steel Treating Co., Newark; for a term of 1 year; also S. N. Clarkson, as executive secretary.

Trustees elected were Fred Heinzelman, Jr., Fred Heinzelman & Sons, New York; Charles H. Hewitt, The Dayton Forging & Heat Treating Co., Dayton; and Paul J. Seitz, Commercial Steel Treating Co., Cleveland, for a term of 2 years.

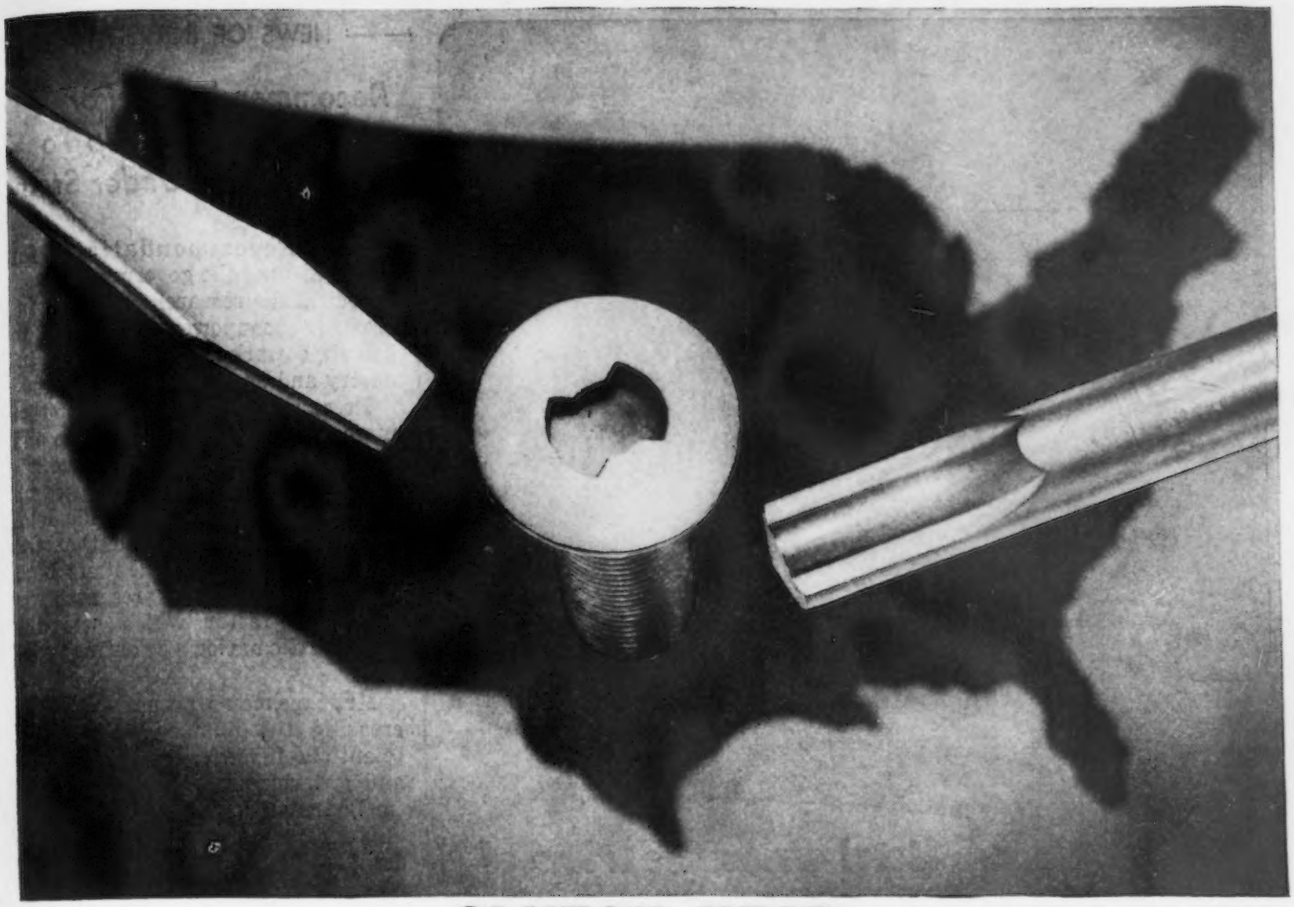
At the meeting, which was attended by representatives of over fifty companies, from Texas, California, the midwest, New England, and Eastern States, a discussion of the relative advantages of atmosphere furnaces and salt baths for different types of heat treating services was presented by N. K. Koebel, Director of Research, Lindberg Engineering Company, Chicago, Illinois, and H. J. Babcock, Research Engineer, Ajax Electric Company, Inc., Philadelphia, Pennsylvania.

Republic Income Up

Cleveland

• • • **Republic Steel** Corp. reports consolidated net income of $6,380,016 for the third quarter of 1947, after all charges, including $4,350,000 provided for federal income taxes. Net income for third quarter of 1946 amounted to $5,039,071 and for the second quarter of 1947 was $5,214,820.

Third quarter earnings are at the rate of $1.05 per share of common stock and amount to approximately 4.1 pct on the sales for the quarter.



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A distinction won by proved performance on power assembly lines... where the records of users credit the exclusive features of CLUTCH HEAD Screws with 15% to 50% production increases.

Higher Visibility of the roomy Clutch recess inspires operator confidence to check out slow-down hesitation.

No Chewed-up Heads. That Center Pivot Column on the Type "A" Bit prevents driver canting and insures automatic straight driving.

Safe Non-tapered Drive eliminates need for end pressure to combat skid hazard "ride-out" as set up by tapered driving.

Slippage Goes to Zero with CLUTCH HEAD's all-square driving engagement. The straight sides of the Bit match straight walls of the Clutch recess, making the drive-home almost effortless.

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Lock-on Breaks "Bottlenecks". Only CLUTCH HEAD provides this feature for easy one-handed reaching to inner spots.

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Fractional Tool Cost. This rugged Type "A" Assembly Bit holds the record of 214,000 screws driven in continuous operation without reconditioning. A 60-second on-the-spot operation restores it to original efficiency... *repeatedly*.

Screwdriver Control. This is the only modern screw basically designed for operation with a common screwdriver... a boon to emergency service.

You are invited to make your own appraisal of these exclusive CLUTCH HEAD *features.*

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CLEVELAND 2 CHICAGO 8 NEW YORK 7

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Ampco Metal makes the difference. The pumps are of the heavy-duty industrial type. They are soundly designed for mechanical durability, high efficiency, and ease of servicing. The paramount feature, however, is the material used in their construction; namely, *all aluminum bronze* as produced in Ampco Metal's laboratory-controlled foundry. These time-proven aluminum bronzes make possible the pumping of such liquids as sulphuric acid, acetic acid, mine water, brines, oils, solvents, beer, food process liquors, etc. Not only are the pump parts in immediate contact with the liquid made of aluminum bronze, but supporting members subject to seepage and spray, such as pedestal, shaft, and sleeve, also are made of this corrosion-resistant material.

Guaranteed efficiencies. These single stage, single suction, corrosion-resistant pumps use totally enclosed impellers. All liquid passages are streamlined for maximum efficiency, quiet operation, and minimum wear. Smooth sloping characteristics have sharp break-off to limit maximum horsepower requirements. All sizes of pumps are available either as pedestal-type for coupling connection to any type of drive, or close-coupled to a face-type motor.

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P-23

Ampco Metal, Inc.

Department IA-11, • Milwaukee 4, Wisconsin

Recommendations For Government Help To Science Under Study

Washington

• • • **Recommendations** for strengthening the government's role in scientific research and for increasing manpower necessary to scientific work now lay before industry and government.

President Truman, in commenting on vol. 3 and 4 of "Science and Public Policy"—analyses of the nation's needs in scientific research prepared by White House aide John R. Steelman — observed that the shortage of trained scientists both for teaching and for research "is the basic factor which sets the limits of the nation's scientific progress."

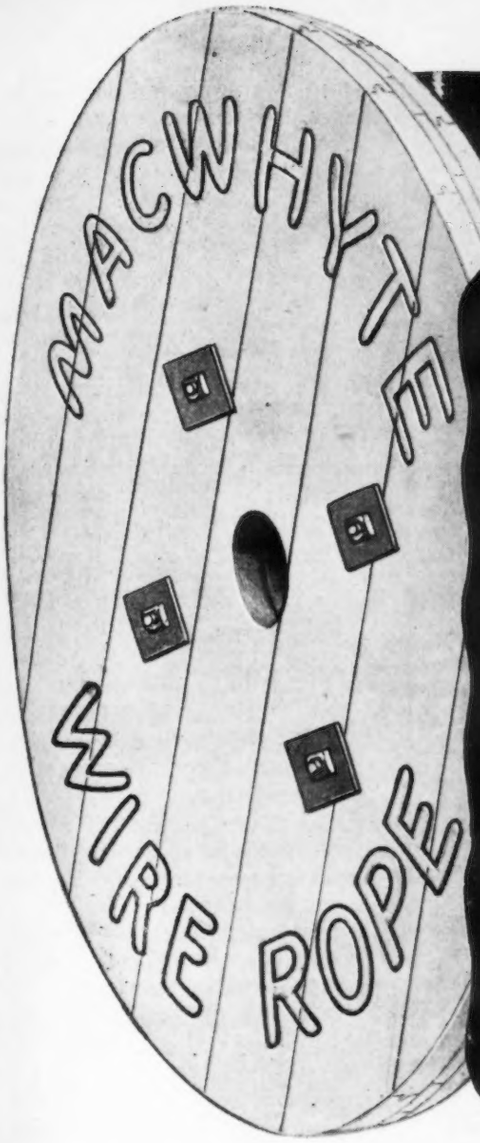
Mr. Steelman's proposals for increasing the number of qualified scientists in industrial, collegiate and governmental laboratories call for financial support to colleges and universities and to deserving students. Specifically, Mr. Steelman believes, a positive program of scientific advancement demands:

(1) Development of sources of financial support for colleges and universities to enable them to expand and improve their facilities, increase staffs and raise salaries.

(2) Development of a broad program for support of basic research in colleges and universities. Such basic research should be extended by legislative establishment of a National Science Foundation.

(3) Development of a national system of scholarships and fellowships to continue federal support of students as the benefits of the Servicemen's Readjustment Act expire.

"For the next 2 years, there will be too few scientists to permit the substantial expansion of research and development programs that the nation requires," Mr. Steelman reports in "Manpower and Research," vol. 4 of the science series. "For the long run, there is danger of a shortage of high-quality scientists. There is no question that tens of thousands of students will be graduated from science courses in the next decade. There is room for serious doubt that the training they can receive under present overcrowded conditions in our colleges



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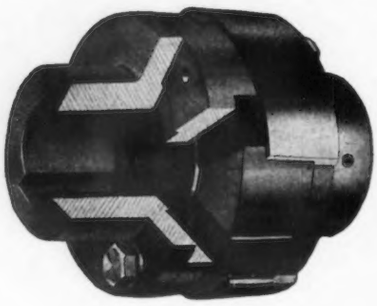

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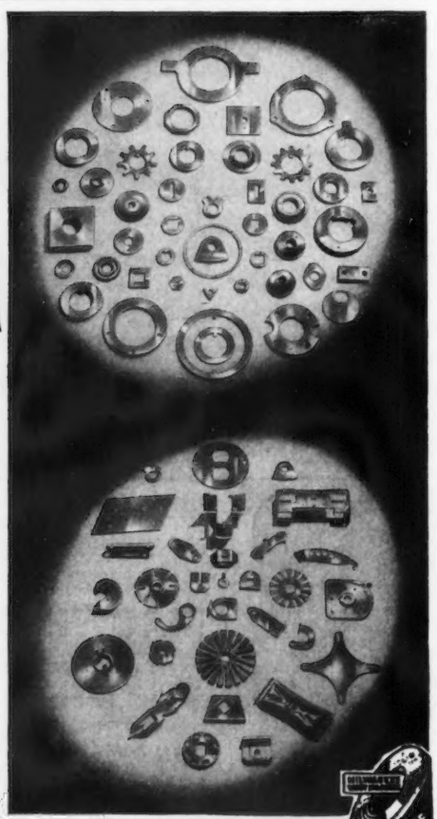

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and universities will make them into capable scientists."

Colleges and universities are the key to the problem, Mr. Steelman believes. "Major efforts must be directed toward improving the financial situation of schools and universities, thus enabling them to attract the scientist-teachers they must have to assure proper training of additional scientists for the future," he states, adding that "it is up to us to build our own foundation for future scientific progress —and this is a time when we lack the scientists for much-needed expansion in industrial and military technology and for the adequate training of potential scientists now in the colleges and universities."

Strengthened administration of government research is imperative, Mr. Steelman concludes. As steps in this direction, he recommends:

(1) Establishment of an interdepartmental committee on scientific research and development.

(2) Establishment of a Budget Bureau unit to review federal scientific research and development programs.

(3) Designation of a White House staff member to act in a scientific liaison capacity.

(4) Establishment of a National Science Foundation.

Mr. Steelman also suggests that government agencies concerned with research take steps to coordinate their research and to establish policy and program committees composed of leading scientists and outside experts to appraise the work being done and to advise on policy issues. Adequate staffs also should be provided to remove the burden of administrative detail from scientists and appropriations should be made for periods of from 3 to 5 years, he recommends.

The use of contracts in government-supported research as executed in World War II is commended by Mr. Steelman. To improve administration in this line, he suggests that contracts be utilized principally for financing applied and developmental studies and placed primarily with industrial laboratories, that contract specifications and procedures be simplified, that grants, rather than contracts, be used for basic research, and, finally, that authority to make grants be afforded all major research agencies.

Dept. of Justice Files Five Anti-Trust Suits

Washington

• • • **In an anti-trust suit** filed in the United States District Court in Trenton, N. J., the Justice Dept. has charged five corporations, said to account for 70 pct of domestic cast iron pressure pipe production, with conspiracy to monopolize and restrain trade in the industry by abuse of patent rights and lease-license agreements.

The defendants are:

United States Pipe and Foundry Co., Burlington, N. J.; James B. Clow & Sons, Chicago; Glamorgan Pipe & Foundry Co., Lynchburg, Va.; Lynchburg Foundry Co., Lynchburg; McWane Cast Iron Co., Birmingham.

The complaint charges that the unlawful action was carried out through lease-license agreements relating to patents, which resulted in limiting the production, types and dimensions of cast iron pressure pipe, controlling selling prices in the United States and maintaining for United States Pipe and Foundry Company a dominant position in the industry.

The suit seeks cancellation of the illegal agreements, and relief against patent abuses, including reasonable royalty licensing.

Research Center Houses Both Labs and Plants

Manville, N. J.

• • • **Involving what** company officials describe as a modular design in which a laboratory is an assembly of flexible work space units, the first of a group of research buildings which will eventually be composed of five or six units connected by underground subways was recently opened by Johns-Manville Corp. at Manville, N. J.

The building is divided lengthwise in half to permit research projects to be carried through the laboratory stage to experimental production under one roof. One half is a two-story laboratory building and the other is a typical three-bay factory building. The manufacturing area is divided into 10 separate pilot plants corresponding to the products under

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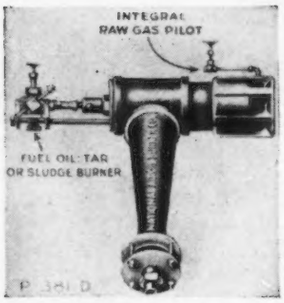

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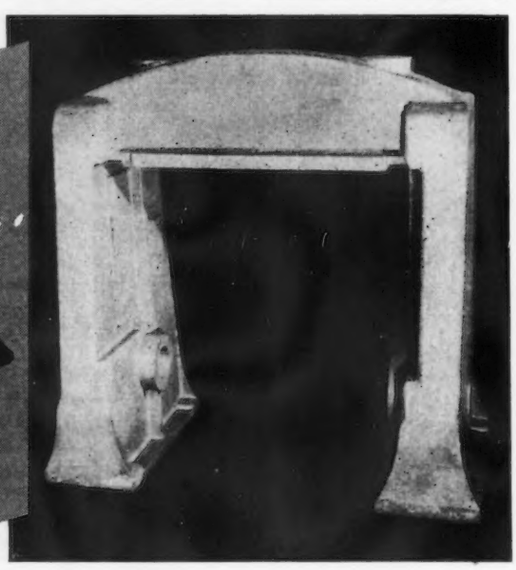

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investigation in the laboratories facing the plants.

Construction methods in the design of this unit, known as the wet semi-works building for product development, include the use of relocatable partitions hung on light-weight metal studs which are held in place by metal channels attached to the ceiling and floor, and hung metal acoustical ceilings with access to piping, wiring and ducts provided. Piping for water, steam, compressed air, vacuum and electrical facilities are concealed in the partitions behind access panels with provisions made for interchangeability. The 10 pilot plants are devoted to work with asbestos fiber, transite pipe, asbestos cement, paper and millboard, shingles, board, asphalt products, material testing, magnesia, fillers and filtration.

Steel Executive Cites Chemical Applications

Baltimore

• • • **Better steel can be** produced through broader application of chemical and chemical engineering techniques, Dr. C. H. Herty, Jr., assistant to the vice-president of the Bethlehem Steel Co., Bethlehem, said recently in an address to the Maryland section of the American Chemical Society at a meeting at Johns Hopkins University.

Citing the steps necessary for converting iron ore to high-grade steel, Dr. Herty declared: "The process of manufacturing steel is replete with problems involving chemical reactions and chemical engineering unit operations. Combustion reactions, diffusion rates, rates of reaction, and equilibria meet one at every turn, and present a challenge and an opportunity to the chemist and the chemical engineer."

The manufacture of steel is a high-temperature chemical operation on a grand scale, he said, stating that the production of steel ingots in 1944 was almost 90 million tons, all processed by various methods involving chemical reactions and chemical engineering unit operations.

Producing the coke used in processing steel constitutes a large chemical industry in itself, making available many valuable byproducts.

New Smelting Process Recovers Nickel Ore As Nickel-Iron Alloy

Washington

• • • **As a result** of the wartime development of an electric smelting process, vast deposits of low-grade nickel ore in the Pacific Northwest offer a potential domestic source for this important metal which can be recovered as a high-grade nickel-iron alloy, the Bureau of Mines has reported in a new publication released by James Boyd, director of the Bureau.

Two of the largest known deposits of nickel ore in the United States are the Cle Elum deposit in Central Washington and the Riddle deposit in Southwestern Oregon. On the basis of exploratory work, the ore reserves in the Cle Elum district are estimated in excess of 5,500,000 tons, while the reserves in the Riddle deposit are estimated at 6 million tons.

In addition to a high-grade nickel-iron alloy recoverable from the Cle Elum ore in the electric smelting process, a low-chromium steel can be removed from the slag, according to results of smelting tests by bureau metallurgists. Both the ferronickel and the low-chromium steel are suitable for the preparation of a wide variety of alloy steels.

The Cle Elum deposit is essentially a nickeliferrous iron ore containing approximately 1 pct nickel, 45 pct iron and 1.7 pct chromium. The Riddle ore contains 1 to 2 pct nickel and only 8 to 10 pct iron. Both deposits are low in phosphorus and sulfur content.

Because of the then existing wartime demand for nickel and the possible need for supplementing Canadian imports, bureau metallurgists made extensive investigations on these two low-grade ores.

By a partial reduction process, they found that 90 to 95 pct of the nickel in either the Cle Elum or Riddle ore can be recovered as ferronickel assaying up to 25 pct nickel. In this process, the ore is smelted with sufficient coke or charcoal to reduce all of the nickel and only part of the iron, the grade of the ferronickel being determined by the relative quantity of reducing agent used.

Although ferronickel of much higher grade than 25 pct can be

Illustration courtesy of Chicago Pneumatic Tool Co. New York, N.Y.

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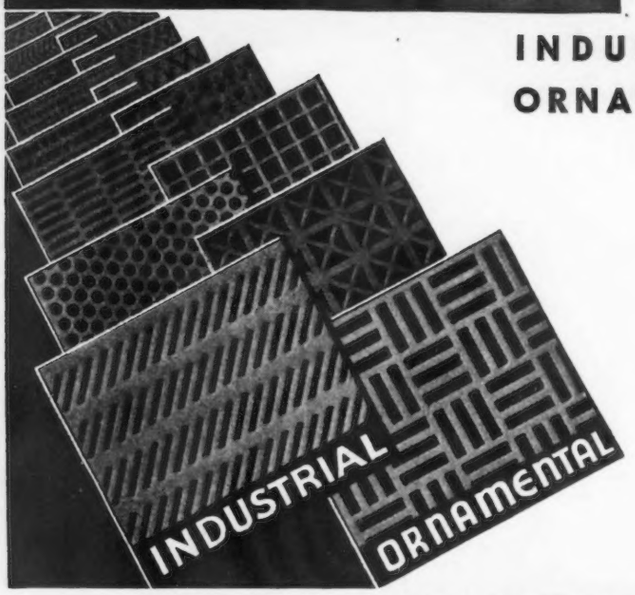

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produced by partial reduction, the loss of nickel in the slag increases rapidly as the grade of ferronickel is increased. High-purity ferronickel assaying up to 76 pct nickel was recovered in a cyclic process involving oxidation of the lower grade ferronickel with iron ore or nickel-iron ore.

The Bureau report dealing with the nickel investigations was prepared by S. F. Ravitz, metallurgist of the Metallurgical Branch at Salt Lake City. In addition to descriptions of detailed operations, the report includes estimates of energy and reducing agent requirements for several possible smelting procedures.

A free copy of the publication, Report of Investigations 4122, "Electric Smelting of Low-Grade Nickel Ores," may be obtained by writing to the Bureau of Mines, Publications Section, 4800 Forbes St., Pittsburgh 13.

Describes Coal As Foundation of The Nation's Industry

Chicago

• • • **At the opening of the** National Coal Assn.'s annual meeting at the LaSalle Hotel, John B. Battle, executive secretary, declared a strong American coal industry to be the principal foundation stone of the nation's industry.

Stating that no industry "is more competitive within itself than coal," Mr. Battle criticized government sponsored and subsidized competition for other fuels. He pointed out that there are 12,000 coal mines scattered throughout some 28 states and intimated if that wasn't competition, he didn't know what was.

Mr. Battle asserted that old age is creeping up on some of the present leaders in the coal industry. He said that it was important to keep in mind that many of these executives within the industry are approaching the time when their duties must be transferred to younger men. "There is no more important duty than to prepare others to take our places," he said.

Turning to employee education, he said the coal industry "must do everything within its power to bring about a better understand-

ing on the part of those who work in the mines concerning the industry's problems." Mr. Battle continued, "I believe strongly that if the employee knows what it means to produce cleaner coal, and something of the problems surrounding the marketing and use of coal, he will feel that his stake in the industry goes farther than just mining."

Canada's External Trade Figures Are Up From Last Year

Toronto

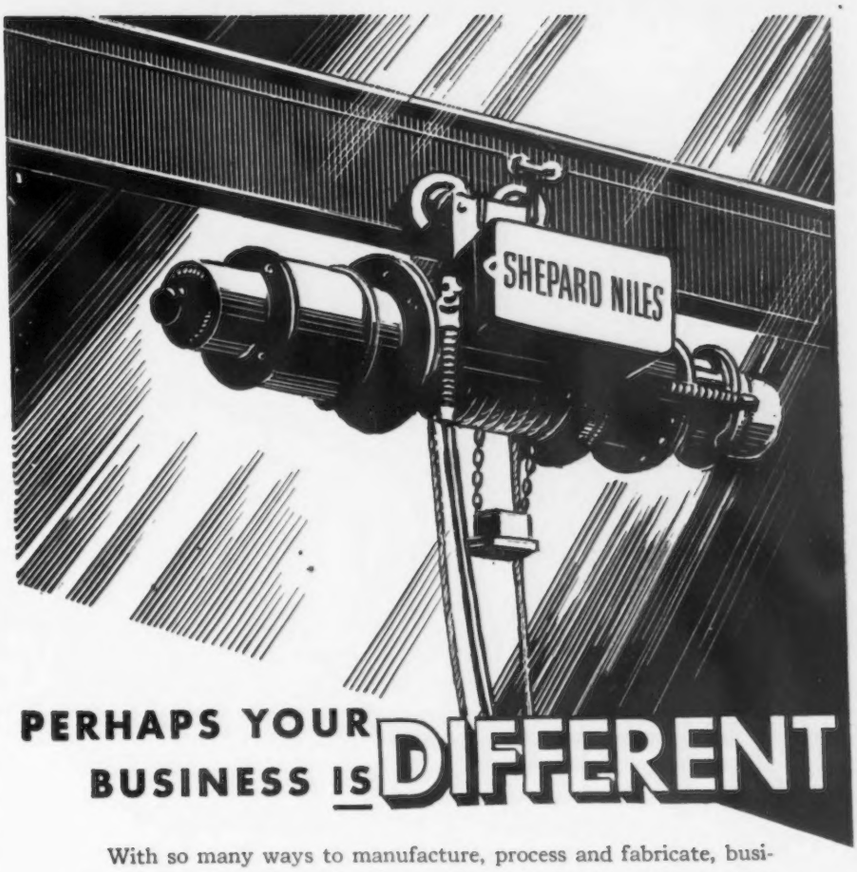
••• **Canada's external trade** for August was valued at $429,400,000, a decrease of 8 pct from the July total of $466,400,000, but was 5 pct above August, 1946, when the total was $409,200,000. For the first eight months of this year Canada's external trade had a value of $3,497,800,000 against $2,715,900,000 in the corresponding period last year, or an increase of 28.7 pct.

Exports in August were valued at $221,300,000, a decrease of 6.5 pct from the July total of $236,600,000 and down 8.9 pct from the $242,700,000 in August, 1946, when exports were at the high for the year. For the eight months ending with August, exports totalled $1,786,000,000 up 16.4 pct from the same period last year totalling $1,494,200,000.

Imports in August amounted to $204,600,000, a decline of 10 pct from the July total of $226,800,000, but a gain of 25.3 pct over August, 1946, when the total was $163,200,000. In the first eight months this year, imports totalled $1,668,100,000 as against $1,204,700,000 in the like period of 1946 or a gain of 40 pct.

Gains were almost general in the iron and steel group for the month under review. Imports of rolling mill products at $6,286,000 compares with $4,645,000 for August, last year; farm implements, and machinery rose to $9,577,000 from $8,072,000; mining, metallurgical, business and other nonfarm machinery at $15,635,000 were up from $10,658,000 in August, last year, and automobiles at $6,683,000 compares with $3,207,000.

All main groups of imports,



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with the exception of agricultural and vegetable products, were higher in value in August than in the corresponding month last year. The largest advance was shown by the iron and steel group which rose from $43,900,000 to $63,700,000. Next in size of gain was the non-metallic minerals group, which advanced from $36,600,000 to $42,100,000.

Signs Contract With USWA Granting 15¢ Hourly Wage Increase

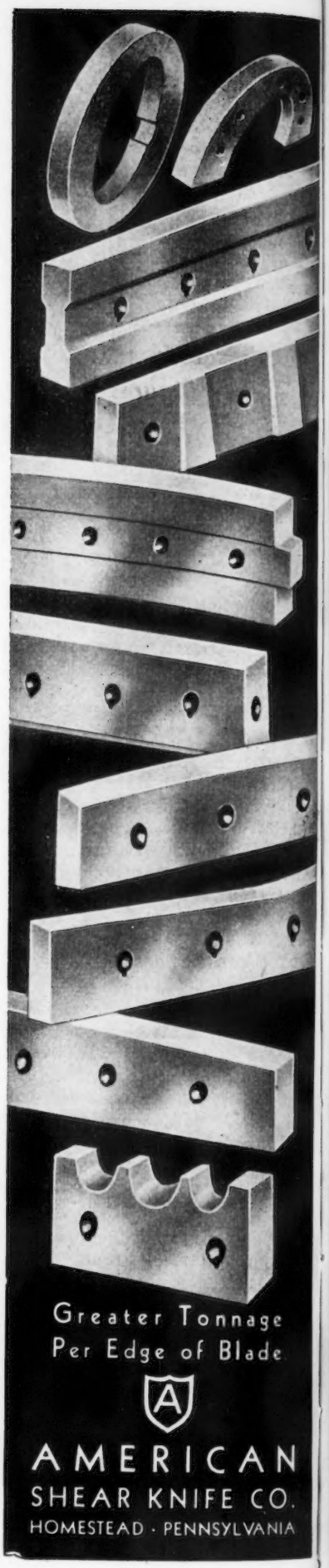
Buffalo

• • • **The New York Car Wheel Co. and the United Steel Workers of America have signed a new contract for 1 year, by which production workers are granted a 15¢ flat hourly wage increase, plus 5¢ an hr to correct wage inequities, and the union agreed to make every reasonable effort to end any strike that might occur during the period.**

This marked the second time in the last 2 years that the company granted a wage increase exceeding the industry and district pattern. In 1946, the workers were given a 21¢ hourly raise compared with the 18½¢ general industry hike. The established pattern this year was 11½¢ an hr plus six paid holidays.

Other provisions of the contract, as disclosed by company president Robert A. Cooley and USW district director Joseph P. Molony, are: 10¢ hourly bonus for night shift workers; time-and-a-half pay for Saturdays and double time for Sundays; the company will pay a worker for time lost because of an injury on the day of the accident and on days when the injured worker has to go to the compensation doctor; the company agreed not to sue the union, and the union agreed that USW president Philip Murray, international representative Edward Janiak and Molony cannot officially call a strike.

The company filed suit against the union a year ago for $750,000 damages as the result of a strike, but the suit was subsequently dropped.



New Trustees Chosen For CED Will Assist With Policy Studies

New York

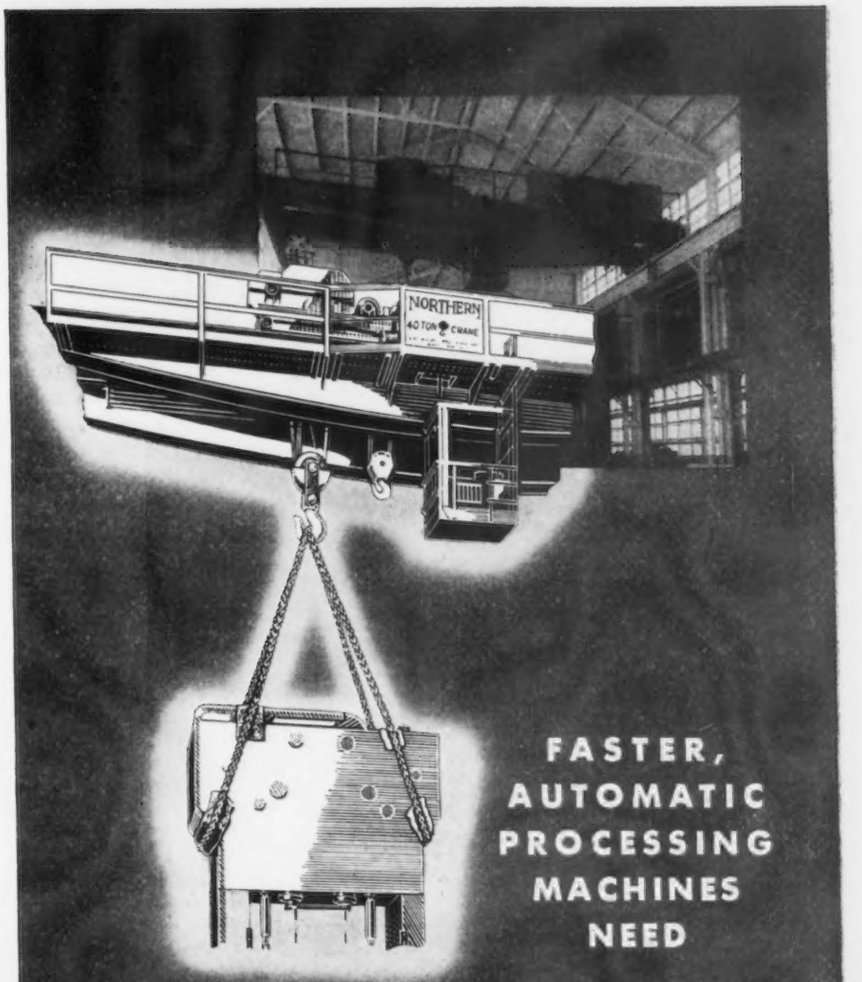
• • • **Election of 16 new trustees** of the Committee for Economic Development was announced recently by its chairman, Paul G. Hoffman. In making the announcement Hoffman said the additional members of the board had been authorized and elected at a meeting of the CED trustees in New York last week and that all of those named had accepted membership.

The new members added to the former CED board of 99 trustees follow:

John W. Barriger, III, president, Chicago, Indianapolis & Louisville Railway (Monon Route), Chicago; Hiland G. Batcheller, president, Allegheny Ludlum Steel Corp., Pittsburgh; William Benton, chairman of the board, Encyclopaedia Britannica, Inc., and Encyclopaedia Britannica Films Inc., New York; Sarah Blanding, president, Vassar College, Poughkeepsie; Everett Needham Case, president, Colgate University, Hamilton, N. Y.; S. Bayard Colgate, chairman of the board, Colgate-Palmolive-Peet Co., Jersey City; Edward B. Cosgrove, president, Minnesota Valley Canning Co., LeSueur, Minn.; Charles E. Denney, president, Northern Pacific Railway Co., St. Paul, Minn.

Also, Alexander Fraser, president, Shell Union Oil Corp., New York; Carlyle Fraser, president, Genuine Parts Co., Atlanta; Larry E. Gubb, chairman of the board, Philco Corp., Philadelphia; William E. Levis, chairman of the board, Owens Illinois Glass Co., Toledo; John P. Stevens, Jr., president, J. P. Stevens & Co., Inc., New York; Charles P. Taft (attorney), Cincinnati; Maxwell M. Upson, chairman of the board, Raymond Concrete Pile Co., New York; L. A. Van Bomel, president, National Dairy Products Corp., New York.

Hoffman said that the trustees had approved six new studies. These studies will be on the European Relief and Rehabilitation, Management of the Public Debt, Labor-Management Relations, Wage-Price Relationships and Monetary Policy.



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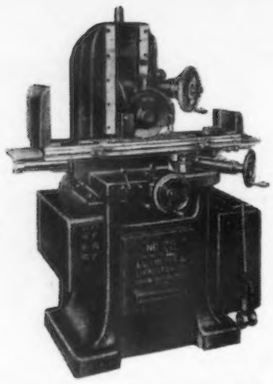
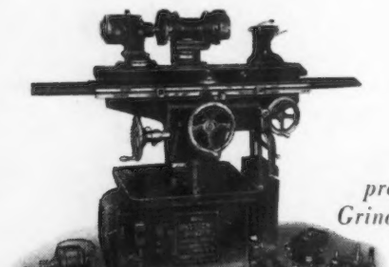


No. 25 Grand Rapids Hydraulic Feed Surface Grinder

Write for Bulletin GL-101



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Kaiser-Frazer Profits May Equal Former Losses

Detroit

• • • **The prediction has been** made that Kaiser-Frazer will earn a profit of $15 million to $20 million for the current year.

For the year 1946 Kaiser-Frazer's operating statement showed a loss of $19 million. Recent production figures show that K-F is fourth in the auto industry and the largest independent producer.

Sometime next year K-F expects to reach 2000-a-day production. Other Kaiser-Frazer plans include construction within a few months of a new $10 million engine plant at a yet unnamed location and early completion of a new assembly plant at Long Beach, Calif. The company is presently undertaking an extensive modernization of the Jefferson plant of Continental Motors Corp. which was recently leased.

At the present time Kaiser-Frazer is assembling 800 cars per day and employing 13,500 workers. Two-shift operations will be necessary to increase production to 1500 cars according to company officials. The Long Beach assembly plant is expected to supply the remaining 500 cars daily.

Engineering Foundation To Sponsor 22 Projects

New York

• • • **The Engineering Foundation** reelected Dr. A. B. Kinzel, vice-president of the Union Carbide & Carbon Research Laboratories, Inc., as its chairman at the annual meeting of its board in the Engineering Societies Bldg., Oct. 16. Other officers who were reelected included: Dr. L. W. Chubb, director of the Westinghouse Research Laboratories, as vice-chairman; Dr. Edwin H. Colpitts, formerly vice-president of the Bell Telephone Laboratories, director; and John H. R. Arms, secretary.

Reports were made at the meeting on thirteen research projects aided by the Engineering Foundation during the past year. These projects were concerned with studies in such varied fields as alloys of iron, metal cutting, welding, properties of gases, riveted and

bolted structural joints, hydraulics and soil mechanics.

Grants were recommended for the year 1947-1948 for the continuation of nine of the past year's 13 projects, and for the support of eight new projects.

"In the selection of research projects to be supported, preference has been given to those of a more fundamental nature which would not be undertaken by an industrial research organization," Dr. Kinzel stated. "Where projects are of interest to a group of industries the foundation has provided a limited financial support and a sponsorship intended to enable the principal support of the project to be secured from interested industries and other sources. Opportunities for productive research are constantly increasing in number and scope. The foundation offers a well recognized and responsible channel for the fruitful expenditure of gifts and bequests, the income from which can be used to aid carefully chosen research projects."

Trade Outlook For Australia Boomed By Repco Director

Chicago

• • • "We see no likelihood of a depression in Australia," reports W. R. Richardson, director of Repco, Ltd., of Melbourne. "Australia has begun to feel the dollar pinch but the Commonwealth's industrial and world trade outlook is even brighter now than it was before the war." According to the visiting industrialist, scores of large manufacturing organizations in Australia have obtained the government's permission to increase their capital in recent months.

Repco, Ltd. is Australia's largest producer of automotive replacement parts. Mr. Richardson has been touring the plants of American automotive concerns during the last month and just recently inspected the plants of Borg-Warner Corp.

Australia's exports of manufactured goods and raw materials to South Africa, India, New Zealand and various other far eastern areas are greater today than in prewar years, according to Mr. Richardson. Australia has a surplus of wool and an adequate supply of wheat and the country is

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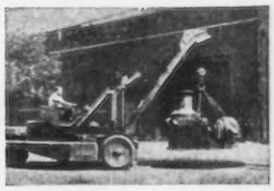
* *Names upon request.*



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THE OHIO KNIFE CO.
CINCINNATI 23, OHIO

Gentlemen: Please send me without obligation your new catalog with specific data on Slitter Knives, Spacers, Straight Blades.

COMPANY_____

NAME_____

ADDRESS_____

The* OHIO KNIFE *Co.

CINCINNATI 23, OHIO, U. S. A.

ARMSTRONG
Setting-Up Tools

Few tool investments pay dividends as consistently as an investment in ARMSTRONG Setting-Up Tools. These correctly designed, strong and convenient tools cut setting-up time to a minimum. They save machine and man hours day after day and assure rigid set-ups for accurate work, prevent accidents and reduce spoilage.

Stocked by Armstrong Distributors

Write for Setting-Up Tool Bulletin.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
309 N. FRANCISCO AVE. NEW YORK — CHICAGO 12, U. S. A. SAN FRANCISCO

HAND CUT YOURSELF A KEYWAY A MINUTE

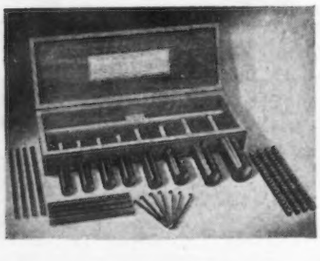
In Gears, Pulley Hubs, Couplings, Collars, Milling Cutters, etc.

With du Mont's *Minute Man* KEYWAY BROACH KIT

Think of the time, trouble and money you'll save when you cut keyways of any standard width, any depth. A few keyways jobs and the Kit has paid for itself.

Deliveries are now being made from stock. Write for the name of the nearest Mill Supply Distributor and a free copy of the new *Minute Man* Catalog, Price List and Reference Manual R.

The du Mont Arbor Press is ideal for keyway broaching and other shop uses.



Kit contains everything you need to cut up to 32 different size keyways — precision broaches bushings, shims, keyway stock.

The du MONT CORPORATION
GREENFIELD, MASSACHUSETTS

hopeful of exporting these commodities in greater quantity to the United States in order to acquire needed dollars to thereby come to a more equitable trade arrangement with this country.

"All Australians would welcome closer economic and social ties with the United States," Mr. Richardson said. "Australia, in the midst of an economic growth, would welcome the emigration of Americans, skilled and semi-skilled workers for our factories, as well as agricultural workers." Mr. Richardson continued that wages in Australia, although lower than American wages, have risen 20 pct since the war and the cost of living has gone up in almost direct ratio.

Mobile Service Unit For Diesel Engines To Be Inaugurated

Detroit

• • • **Detroit Diesel** Engine Div. of General Motors is inaugurating a new mobile service to bring assistance to users of diesel engines in out-of-the-way localities which may be many miles from the nearest service point.

The first of these "repair shops on wheels" has just been completed and for the next 60 or 90 days these units will operate throughout the state of Michigan where their performance and efficiency can be followed closely.

A Chevrolet one-half panel truck model has been designed to handle all kinds of engine servicing work, excepting a major overhaul.

The service unit is equipped with power-driven tools and equipment such as battery chargers, electric drills, valve seat grinders and a 3 cu ft air compressor which can be connected to a 1500 watt, 110 volt AC gasoline-driven generator.

A complete set of tools and trouble shooting instruments are available to the mechanic who needs help in analyzing trouble sources. Replacement parts are available in neatly designed metal bins built into the rear section of the truck. Three hundred such items are carried.

Based on its service studies, Detroit Diesel carefully selected the parts most commonly used in field service activities.

Machine Straightens And Polishes Wire For Fishing Hooks

Washington

• • • **A German machine** of ingenious design for straightening wire for producing fishhooks is described briefly in a British report now on sale by the Office of Technical Services, Dept. of Commerce. An exact straightening is achieved and at the same time a perfect pore free, condensed and highly polished surface is obtained. The machine was made by the firm F. W. Bundgens at Aachen, Germany.

In this machine the bar passes between two rotating discs which press against it. Thus the bar receives a fast rotating movement and a forward movement at the same time. The adjustable pressure of these polishing discs causes a condensing and equalizing of the bar. Then the bar moves through three straightening bushings run on roller bearings.

The bar then passes between a second pair of polishing discs where it is further condensed and highly polished. It is claimed that bars up to nearly an inch in diameter may be straightened on these machines. The speed of straightening and cutting bars to lengths for fishing hooks is 300 per min.

The report also briefly describes automatic pointing, barbing, and bending, and discusses machines used in making agate rings for fishing rods. A diagram of the wire straightening machine is included.

Orders for the report (PB-78726; Report on German Manufacture of Fish Hooks; photostat, $1, microfilm, $1; 8 p.) should be addressed to the Office of Technical Services, Dept. of Commerce, Washington 25, and should be accompanied by check or money order, payable to the Treasurer of the United States.

Quarterly Profit Drops

Buffalo

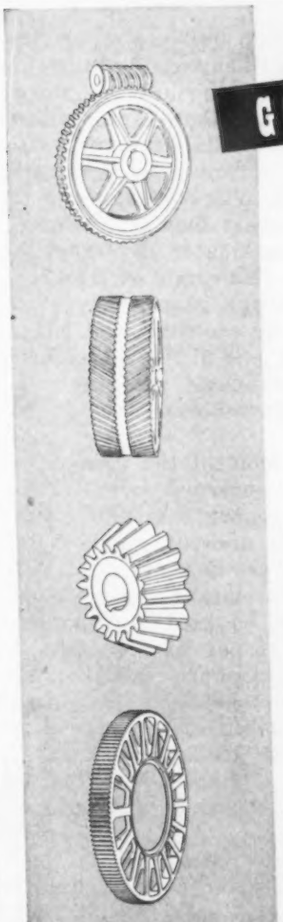
• • • **Buffalo Forge** Co. and subsidiaries reported net profit of $662,193 for the quarter ended Aug. 31 after provision for federal and Canadian income taxes, equal to $2.04 a common share. This compared with net of $878,404, or $2.70 a common share in the preceding quarter, and $246,750, or 76¢ a share in the corresponding 3 months of 1946.

"When I worked in Dayton, we used ***Strenes Metal*** cast dies for refrigerator tops and doors. Saved a lot of time and cost on tooling up. And we got longer runs between redressings."

That's the way the good word about ***Strenes Metal*** cast dies has spread from shop to shop. A number of instances are shown in our picture book titled "*Strenes Metal Castings.*" A copy is yours for the asking. Write us now while you're thinking about it.

Strenes Metal
DRAWING AND FORMING DIES

THE ADVANCE FOUNDRY COMPANY
100 SEMINARY AVENUE — DAYTON 3, OHIO



GOOD BUSINESS FOR YOU

During our forty-odd years of experience in the manufacture of gears of every size and type and special machinery, we have found that it's good business to give our customers exactly the kind of work they want.

That's why every Earle gear, large or small, is made to meet your requirements exactly—to give you better power transmission, maximum strength, long life and smooth, quiet operation.

Giving you the kind of work you want is good business for us. Getting exactly what you want is good business for you.

Let's do business together—send us your drawings or specifications for quotation. The EARLE GEAR AND MACHINE CO., 4715 Stenton Ave., Philadelphia 44, Pa. Sales Offices: 149 Broadway, New York 6; 901 Davis Ave., Pittsburgh 12, Pa.

EARLE GEARS

SPUR, BEVEL, WORM, SPIRAL, HERRINGBONE AND RACKS, ETC.

MACHINE TOOLS

. . . News and Market Activities

Customers in a Buying Mood; Next Year Feared by Some

• • • **Customers are** in a buying mood and reports of a fast and furious fourth quarter in the machine tool business, with November the peak month, perhaps for all of 1947 as a result of the Machine Tool Show, are filtering through the trade.

In the absence of any official figures or an estimate, October proved to be a better month than September, according to qualified observers, who also point out that September was a better month than August. But to make the fourth quarter the biggest of 1947, the machine tool industry and its associates will have to move with great alacrity, for December is usually an off month. And after the first of the year, the pessimists are already saying, almost anything can happen.

In Detroit, a survey of machine tool producers and distributors indicates that the pace in the machine tool and die industries has quickened appreciably since the Machine Tool Show. While much of the prospective new business is still in the inquiry stage, suppliers are confident that a substantial number of firm orders will result from the recent Chicago showing.

Detroit shops producing highly integrated special purpose tools are being pressed hard to make deliveries of equipment that will be used in the production of postwar model cars, despite recent postponements in the introduction date of several models.

Tool and die programs that have been comparatively modest up to recently have now gained considerable momentum, it is reported. The big Ford tooling program is now scheduled for completion next Spring. During the past week, orders for the new General Motors "A" body have been reported. indicating that the last of the GM tooling programs has been started. Trade sources indicate that Chevrolet's comparatively modest tooling program for its 1948 model has now been released, but the 1949 program will undoubtedly come along very rapidly if it appears that Ford is going to get off to a flying start with its new postwar car.

Acceleration Needed in This Month to Offset Usual December Slump

° ° °

The impression is growing in Detroit that although new model introductions have heretofore often been postponed because no sales stimulation was needed, new competitive factors are beginning to assert themselves and these competitive factors are expected to become more important as additional postwar models are introduced.

In Chicago builders report that they are still engaged in followups generated by the intense interest created at the show. Some makers report the ratio of actual sales compared to prospects is surprisingly high. The companies on the average report they still have a 6 months' backlog on most types of machines. Materials such as castings, bearings, gears, etc. are reported to be showing some easing in supply and delivery promises on raw materials are in general much improved over 3 or 6 months ago.

At the moment the industry is a little concerned over prices. Builders report that the higher labor costs are now really being felt and there is some doubt as to how much longer the present prices can be held. In the new automatic types of machines, if higher prices are invoked, the makers don't believe they will affect the volume of new orders. These men point out that the number of manhours saved by the machine in many cases would, at present labor wages, help amortize the investment in a very short time. General purpose machinery, however, is another story and therein lie a few unknown factors which the makers are unable to evaluate.

In the East, the current shortage of orders has required some dealers in new tools to take on some orders for used tools in order to carry their overhead. They feel that the tool builders have priced themselves out of the market, because the users can't see into the economic future far enough ahead to justify the price spread in new and used tools.

At the first eastern regional meeting of the Machinery Dealers National Assn., held at New York last week, Louis Botwinick, New Haven, Conn., predicted a growing shortage of used standard tools due to the tremendous demand for WAA tools of this type since the end of the war. Dealers in used tools remark that there are still standard type tools in WAA stocks. In most instances, however, they are not inventoried or are earmarked for JANMAT.

The export market, like the old gray mare, is not what it used to be, due to a scarcity of American dollars in foreign countries. The situation is not hopeless, however. China has just placed business in Massachusetts despite the fact that builders have been reluctant to take orders from there. A lot of tools are being shipped to India on old orders and new business is in the making. Two Dutch industrialists have been consulting with Reed-Prentice Corp. and Arter Grinding Co., Worcester, regarding equipment and financing.

Sweden is confiscating every American dollar over $50 held there and toolmakers have been advised to lay off orders from that country. Mexico's uncertain political position makes that country a bad risk. The trade is holding tools for South America, Norway, France, Switzerland and China, but have no export licenses.

It is hoped that when the Marshall Plan becomes operative the export situation will right itself. There could be a lot of export business if foreigners could only arrange payments.

How Bliss Hydraulic and Mechanical Presses Team Up to Triple Production at Hotpoint, Inc.

In keeping with their policy of employing the most modern methods of manufacture, the tool engineers of Hotpoint, Inc., makers of high-quality electric ranges, selected three special Bliss 500-ton single-action Hydraulic Presses and two Bliss straight-side Mechanical Presses to perform all the press operations required in the production of the new Calrod units for these ranges. Here's how:

Six-station Bliss dial feed on each hydraulic press allows multiple operations—loading, pressing and unloading—at one time. The press need never be idle. Operation is by electric push-button.

Two operations are performed simultaneously at a single stroke—terminal forming and flattening; hydraulic press cycle completed in 10 seconds.

Hydraulic press output is 350 pieces per hour from each unit.

Mechanical presses do final terminal forming—200 pieces per hour on each Bliss 95-ton Straight Side Press.

Added together, this combination of Bliss hydraulic and mechanical presses has tripled Hotpoint's production over previous equipment.

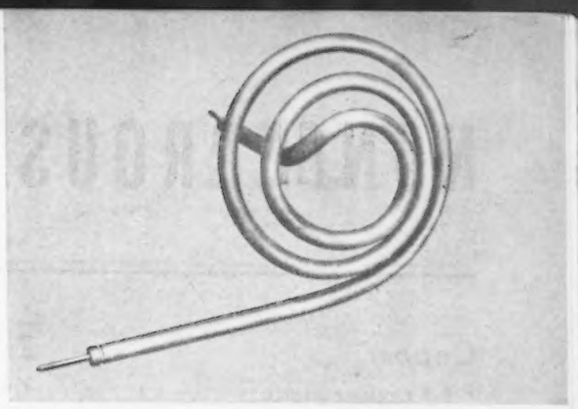
Here, again, is a case example of Bliss press performance—both hydraulic and mechanical—plus Bliss' combined experience in the manufacture and application of both types—stamping added "dividends" on another busy production line.

Bliss sales engineers are production counselors, too. Put your pressed-metal problem before them.

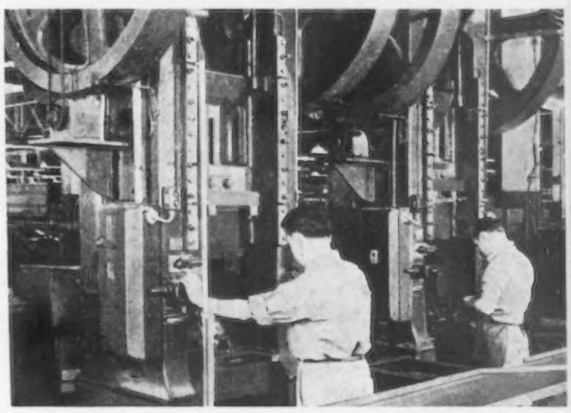
E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Can and Container Machinery

WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Michigan; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France • SALES OFFICES: Detroit; New York; Cleveland, Dayton, Toledo, Ohio; Hastings, Michigan; Chicago; Philadelphia, Pittsburgh, Pa.; Rochester; New Haven; Boston; Windsor, Ont.



The Calrod unit is made from Inconel, a nickel alloy. Stepped design presented a difficult die problem.



Two standard 95-ton straight side presses of Bliss design perform final terminal forming operation.

Slide of press cannot descend if the Calrod unit is not placed properly in the die. Quick advance and quick return features are a decided improvement over equipment formerly used.

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY

STAY AHEAD WITH *Bliss*

NONFERROUS METALS

. . . News and Market Activities

Copper

• • • **Copper producers** report that demand for the metal continues strong. The continuing strike of railroad employees at the Utah mine of Kennecott is a serious threat to the copper market as the operation has been closed down. This mine is a producer of some 15,000 tons of copper per month. It is reported that some consumers are having difficulty in placing their requirements for the balance of the year.

Producers report that the demand from wire mills remains high and that the brass mills are ordering in larger tonnages in recent weeks. Some foreign business in copper is being transacted although the volume is admitted to be well below former levels. The price holds at 21.50¢ f.a.s. New York, but reports in the trade indicate that some sales have been made at 21.375¢.

If the Kennecott strike continues for any length of time, there is no doubt that the domestic copper market may return again to a critically short position. Major producers do not expect that under those circumstances the price of copper would be advanced beyond its present level. Every effort will be made by producers to restrain any development that would serve to deteriorate the competitive position of copper wire and brass mill products relative to other metals.

Chile's Senate voted down the proposed 20 pct increase in taxes on copper but the Chamber of Deputies immediately revoted the increase by a bare ⅔ vote. If the measure is voted down again by the Senate by a ⅔ vote, it will die. However this will require some realignment of votes to extend the previous majority.

Zinc

• • • **Consumers are** reported to be coming into the market for larger tonnages of most grades of zinc, reflecting their previous reduction in inventory, to the minimum. Major demand centers around Prime Western and Special High Grade. High Grade demand is somewhat lower and Brass Special is inactive. Car movements are slow, requiring consumers to order ahead in order to protect working inventories. Increased strength was reported in the export market with all producers now quoting Prime Western at 10.00¢ f.a.s. Gulf Ports.

•

Aluminum

• • • **Demand for aluminum** products is improving to the point at which sheets are reported to be obtainable on 8 to 9 weeks delivery. Industry members have pointed out that the backlogs for most aluminum products are growing rapidly and that for sheet orders placed now, delivery is more likely to be made in from 10 to 12 weeks. There are indications, moreover, that there may be a marked change in the aluminum scrap supply over the next few months, according to industry reports. The low level of aluminum fabricating work during the summer may result in a sharp drop in the available supply it is said.

•

Lead

• • • **Increasing tightness** in the lead market made itself felt during the week when some consumers found they could not obtain all their requirements from producers and were forced, producers say, to seek a tonnage from the Office of Materials Distribution. The increased consumption at this time is believed to be due largely to the summer reduction of inventories when it became apparent that lead was freely available and many consumers scented an approaching price decline in the metal.

•

To Renew Premium Plan

New York

• • • **With the end** of the summer decline in nonferrous metals consumption and the growing short position in copper and lead, and better balance in zinc, the metal industry is giving much consideration to the absence of a subsidy program to encourage high cost producers of those metals to continue in operation. Many zinc mines and some lead and copper mines have been forced to close down since the President's veto of the Allen bill. Nevada's Representative Russell has recently stated that his bill for a 5-year program of subsidizing the production of copper, lead and zinc to the extent of $80 million a year would be brought before the next session of Congress. The bill, reported out by the Rules Committee, provides for the establishment of a minerals resources division in the Interior Dept. for administration of the subsidies.

Monthly Average Prices

• • • **The average prices of the major nonferrous metals in October based on quotations appearing in** THE IRON AGE, **were as follows:**

	Cents Per Pound
Electrolytic copper, Conn. Valley	21.50
Lake copper, Conn. Valley	21.625
Straits tin, New York	80.00
Zinc, East St. Louis	10.50
Zinc, New York	11.04
Lead, St. Louis	14.80
Lead, New York	15.00

Nonferrous Metals Prices

Cents per pound

	Oct. 29	Oct. 30	Oct. 31	Nov. 1	Nov. 3	Nov. 4
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	80.00	80.00	80.00	80.00	80.00	80.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Primary Metals

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point, freight allowed	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	33.00
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$17.00
Beryllium aluminum 5% Be, dollars per lb contained Be	$35.50
Cadmium, del'd	$1.75
Cobalt, 97-99% (per lb)	$1.65 to $1.72
Copper electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$80 to $90
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%	20.50
Magnesium, sticks, carlots	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$81 to $83
Nickel, electro, f.o.b. New York	37.67
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$59 to $62
Silver, New York, cents per oz.	74.50
Tin, Straits, New York	80.00
Zinc, East St. Louis	10.50
Zinc, New York	11.06
Zirconium copper, 6 pct Zr. per lb contained Zr	$3.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No 115	17.50-18.00
No. 120	17.00-17.50
No. 123	16.50-17.00
80-10-10 ingot	
No. 305	21.50-22.00
No. 215	19.50-20.00
88-10-2 ingot	
No. 210	27.25-27.75
No. 215	25.75-26.25
No. 245	19.75-20.25
Yellow ingot	
No. 405	13.75-14.50
Manganese Bronze	
No. 421	15.75-16.50

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	15.75
0.60 copper, max.	15.50
Piston alloys (No. 122 type)	14.00 to 14.50
No. 12 alum. (No. 2 grade)	13.75
108 alloy	14.00
195 alloy	14.75
AXS-679	14.25
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1—95 pct-97½ pct	14.50
Grade 2—92 pct-95 pct	12.75
Grade 3—90 pct-92 pct	12.00-12.25
Grade 4—85 pct-90 pct	11.50-11.75

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	37¾
Electrodeposited	32.34
Rolled, oval, straight, delivered	32.59
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	33¾
Zinc, Cast, 99.99	18¾
Nickel, 99 pct plus, frt allowed	
cast	51
Rolled, depolarized	52
Silver 999 fine	
Rolled, 1000 oz. lots, per troy oz.	67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	43.00
Copper sulphate, 99.5, crystals, bbls	11.50
Nickel salts, single, 425 lb bbls, frt allowed	14.50
Silver cyanide, 100 oz. lots, per oz.	54.00
Sodium cyanide, 96 pct, domestic, 200 lb drums	15.00
Zinc cyanide, 100 lb drums	34.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed	7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall; 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam. rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base. B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16; 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb f.o.b. mill. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75.

Round Rod: M, diam, in., ¼ to ⅜, 47¢; ½ to ¾, 45¢ 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢; 38 to 40, 75.5¢; 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.21; 5/16 to ⅜, $1.12; ⅜ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢; 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.50
Ribbon, ton lots	14.50
Plates	
Small	13.50
Large, over 12 in.	14.50

Copper, Brass, Bronze

(Cents per pound, f.o.b. mill effective June 11)

	Extruded Shapes	Rods	Sheets
Copper	33.53	....	33.68
Copper, hot-rolled	....	30.03	....
Copper, drawn	....	31.03	....
Low brass	34.04*	31.07	31.38
Yellow brass	32.39*	29.32	29.63
Red brass	34.65*	31.68	31.99
Naval brass	29.56	28.31	34.25
Leaded brass	27.98	24.39	30.13
Commercial bronze	35.52*	32.80	33.11
Manganese bronze	33.14	31.64	37.75
Phosphor bronze, 5 pct.	53.25*	52.25	52.00
Muntz metal	29.17	27.92	32.36
Everdur, Herculoy, Olympic, etc.	37.07	35.57	38.44
Nickel silver, 5 pct.	41.20	40.28	38.67
Architectural bronze	27.94	....	....

*Seamless tubing.

Scrap Metals

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Brass Mill Scrap

(Lots of less than 15,000 lb.)

Cartridge brass turnings	14½
Loose yellow brass trimmings	15½

Copper and Brass

No. 1 heavy copper and wire	15½—16
No. 2 heavy copper and wire	14½—15
Light copper	13 —13½
Auto radiators (unsweated)	8¼— 8¾
No. 1 composition	11 —11½
No. 1 composition turnings	10½—11
Clean red car boxes	9 — 9¼
Cocks and faucets	8¾— 9¼
Mixed heavy yellow brass	6½— 7
Old rolled brass	7 — 7½
Brass pipe	8¼— 8¾
New soft brass clippings	11 —11½
Brass rod ends	8½— 9
No. 1 brass rod turnings	8 — 8½

Aluminum

Alum. pistons free of struts	3½— 4
Aluminum crankcases	5½— 6
2S aluminum clippings	8 — 8½
Old sheet & utensils	5½— 6
Mixed borings and turnings	— 2
Misc. cast aluminum	5 — 5½
Dural clips (24S)	4½— 5

Zinc

New zinc clippings	5½— 6
Old zinc	4¼— 4½
Zinc routings	2½— 3
Old die cast scrap	2½— 3

Nickel and Monel

Pure nickel clippings	15½—17½
Clean nickel turnings	14 —15
Nickel anodes	16 —17
Nickel rod ends	16 —17
New Monel clippings	12 —13
Clean Monel turnings	7 — 8
Old sheet Monel	10 —10½
Old Monel castings	7½— 8
Inconel clippings	8 — 8½
Nickel silver clippings, mixed	7½— 8
Nickel silver turnings, mixed	5½— 6

Lead

Soft scrap lead	10½—11
Battery plates (dry)	5 — 5⅛

Magnesium Alloys

Segregated solids	6½— 7
Castings	4½— 5½

Miscellaneous

Block tin	63 —65
No. 1 pewter	48 —50
No. 1 auto babbitt	38 —40
Mixed common babbitt	11½—12
Solder joints	13 —13½
Siphon tops	38 —39
Small foundry type	13 —13½
Monotype	12 —12½
Lino and stereotype	11½—12
Electrotype	9½—10
New type shell cuttings	11 —11½
Clean hand picked type shells	4½— 5
Lino and stereo dross	5 — 5½
Electro dross	3 — 3¼

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect Freight equalized with nearest free delivery point.

Full lead sheets	18.25
Cut lead sheets	18.75
Lead pipe, manufacturing point	17.50
Lead traps and bends	List +42%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules	List +42%
Lead wool	19.50

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SCRAP

Upward Trend Arrested Near Peak

New York

• • • **The sharp upward** trend of the scrap market, which hit an all-time high for the second successive week last week, has been stayed, as shipments improved with the higher prices. Prices in Pittsburgh and Philadelphia on heavy melting grades remained stable at last week's quotations, and the Chicago price fell sharply from a top of $43 to a top of $40.

Prices in outlying markets, which have been the center of feverish competitive bidding in recent weeks, have also quieted slightly this week. Mills are offering substantially lower prices for the beginning of the month, but in most cases these offers have yet to be tested.

The recent sharp upward break had the effect of bringing a number of mills into the market that had held out for some weeks. The substantial sales at high prices brought out fairly large movements of scrap, within the limitations of the current overall scrap shortage. The high peak of prices, however, tended to discourage buyers, many of whom stated flatly that they were out of the market.

Later reluctant sales made at lower levels are not considered to be an indication of any long term easing of the scrap supply picture. The lower priced sales made in some of the country's scrap markets now appear to be due for a period of severe testing before their worth can be evaluated.

THE IRON AGE, scrap composite price this week dropped to $41.50, down $1.08 from the record level set last week. The reduction was brought about by the drop in the price of heavy melting steel in Chicago, while the Philadelphia and Pittsburgh quotations remained stable.

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PITTSBURGH—In the absence of any openhearth buying the market remains quotable at $40 to $45 for these grades. The $40 figure represents the local market though brokers are paying up to $42.50 for local material this week. As explained in the box on the scrap price page, $45 is the representative average delivered price of material originating outside the immediate local area. While the three firms which have the $40 orders would take a loss if they filled them now, most are expected to average out on orders for $43 and more which they have on their books. This is particularly true because the higher priced orders call for much greater tonnages than the $40 sales. A local cast iron consumer has received a pig iron cut which puts him in the market for additional cast scrap. The cast market is up $1 here this week and supply prospects for substantial new tonnages are poor. Last week's quotation on R. R. coil springs was a typographical error: it should have read $51 to $52.

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CHICAGO—The trade reports that the new sales made at $39 were made with reluctance. Many brokers and dealers were still covering the $43 orders last week at prices from $40 to $41. All observers were in agreement that in no case were brokers interested in short sales and everyone was using extreme caution as the acid test of new prices is yet to come. Prices on turnings, borings, railroad heavy melting and low phos scrap were quotable at widely different levels depending upon the particular arrangements made in each case.

•

PHILADELPHIA — Although the market showed increased strength last week, there were no transactions requiring higher quoted prices on major grades. The current quotation on heavy melting grades is based on a number of sales to consumers last week and the preceding week, one of which involved a large tonnage. Eugene Grace stated recently that Bethlehem's scrap reserves averaged 1 to 2 weeks operating requirements. It is reported that other mills in this area are not in an appreciably better position. Higher prices are quoted on chemical borings and low phos grades.

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CLEVELAND—Scrap market conditions are generally unchanged since last week in Cleveland and the Valley, and demand is strong and supply weak. Most of the openhearth material moving is on old orders, which will tend to support present prices. There are rumors of a return on the part of some consumers to springboards, or the old OPA method of figuring scrap prices, but this remains to be seen. The market is still uncertain, and consumers are paying different prices for identical grades.

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DETROIT—The price of No. 1 heavy melting scrap is reported to be holding here at $35.25 on a broker buying basis ($37 delivered to the consumer), but there are strong factors operating tending to boost this figure despite current reports that the market has been stabilized. Some local dealers are reporting offers ranging from $37 to $39 for quick carload shipments against orders taken at the recently prevailing high prices. Informed sources agreed that price stabilization will be difficult to achieve if all existing orders are to be filled. The demand for borings and turnings continues strong and the price of low phos plate is up $1.25 as compared with the previous week. The price of No. 1 cupola is also stronger.

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NEW YORK—High scrap prices have served to bring in the best flow of scrap in recent weeks. Cast grades are generally remaining strong, but there are some signs of weakness in steelmaking grades. The prices on heavy melting steel grades remain at $38.00 to $39.00, the previous quotation.

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BOSTON—On the one hand brokers have prices at which mills say they will buy, these not being worthy of consideration according to the trade. On the other hand a limited amount of business for eastern Pennsylvania delivery on old orders is passing on a basis of $36 for No. 2 steel and $28.50 for machine shop turnings, about $5 and $2.50, respectively, above mill offers. Only prices holding, and these at the October peaks, are those for cast.

•

ST. LOUIS—Steel mills in this district have abandoned their plan of buying No. 2 heavy melting steel on the basis of Chicago prices, as they endeavored to do in October. Their offerings for November are on the basis of $37.00 to $38.00 per ton delivered. The mills found they were unable to buy any material on the Chicago basis, and scrap was going to other markets. The high price orders have about been cleaned up and mills hope that the new offerings established will stimulate shipments.

•

BIRMINGHAM—The price situation in this market is static with apparently no takers for the $35 per ton offered for open hearth grades by Republic Steel Corp., the district's largest scrap consumer. Brokers report that the last tonnages of any size sold for delivery in this area went for $38. Cast grades are the scarcest in months and users are anxious to get anything that is offered.

•

CINCINNATI—The market here is still in the throes of an upheaval. Some of the brokers are buying, but rather than sell locally for $38.50 to $39.00, are threatening to send it into higher markets. And there is some evidence that a small amount of this is being done. Rumors indicate that some mills are buying from distant markets at higher prices than these of this district.

•

TORONTO — Nothing in the way of new developments appeared in the Canadian scrap markets in the past week. Receipts are holding at a steady level with only minor improvement as a result of recent price advances in steel grades. Local dealers continue to report most offerings from industrial plants, to which are added occasional shipments from outside points.

PITTSBURGH

Per gross ton delivered to consumer†:

No. 1 hvy. melting	$40.00 to $45.00
RR. hvy. melting	42.50 to 43.50
No. 2 hvy. melting	40.00 to 45.00
RR. scrap rails	47.50 to 48.50
Rails 2 ft. and under	51.00 to 52.00
No. 1 comp'd bundles	40.00 to 45.00
Hand bdld. new shts.	40.00 to 45.00
Hvy. axle turn.	41.50 to 42.00
Hvy. steel forge turn.	41.50 to 42.00
Mach. shop turn.	35.00 to 35.50
Shoveling turn.	36.50 to 37.00
Mixed bor. and turn.	35.00 to 35.50
Cast iron borings	35.50 to 36.00
No. 1 cupola cast.	48.00 to 49.00
Hvy. breakable cast.	39.00 to 40.00
Malleable	55.00 to 56.00
RR. knuck. and coup.	51.00 to 52.00
RR. coil springs	51.00 to 52.00
RR. leaf springs	51.00 to 52.00
Rolled steel wheels	51.00 to 52.00
Low phos.	47.00 to 48.00

†See box on this page.

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	39.00 to 40.00
No. 2 dealers' bundles	39.00 to 40.00
Bundled mach. shop turn.	39.00 to 40.00
Galv. bundles	37.00 to 38.00
Mach. shop turn.	34.00 to 35.00
Short shov. turn.	36.00 to 38.00
Cast iron borings	36.00 to 37.00
Mix. borings & turn.	34.00 to 35.00
Low phos, hvy. forge	47.50 to 48.00
Low phos, plates	45.00 to 45.50
No. 1 RR. hvy. melt.	45.00 to 45.50
Rerolling rails	55.50 to 56.50
Miscellaneous rails	49.50 to 50.50
Angles & splice bars	50.00 to 50.50
Locomotive tires, cut	49.00 to 50.00
Cut bolster & side frames	48.00 to 48.50
Standard stl. car axles	55.50 to 56.00
No. 3 steel wheels	47.50 to 48.00
Couplers & knuckles	48.50 to 49.00
Rails 2 ft. and under	55.00 to 55.50
Malleable	64.00 to 65.00
No. 1 mach. cast.	52.00 to 53.00
No. 1 agricul. cast.	49.00 to 50.00
Hvy. breakable cast.	40.00 to 42.00
RR. grate bars	46.00 to 47.00
Cast iron brake shoes	46.50 to 47.00
Cast iron carwheels	45.50 to 46.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.00 to $40.00
No. 2 hvy. melting	38.00 to 40.00
No. 1 bundles	38.00 to 40.00
No. 2 bundles	38.00 to 40.00
Mach. shop turn.	29.50 to 30.00
Shoveling turn.	31.50 to 32.00
Cast iron borings	29.50 to 30.00
Mixed bor. & turn.	29.00 to 30.00
Low phos. plate	40.00 to 41.00
No. 1 cupola cast.	45.00 to 46.00
Hvy. breakable cast.	36.00 to 37.00
Scrap rails	40.00 to 41.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	36.00
Nos. 1 and 2 bundles	36.00
Busheling	36.00
Shoveling turn.	28.00 to 29.00
Machine shop turn.	26.00 to 28.50
Mixed bor. & turn.	26.00 to 28.50
Cl'n cast. chem. bor.	34.00 to 34.50
No. 1 machinery cast.	43.00 to 44.00
No. 2 machinery cast.	43.00 to 44.00
Heavy breakable cast.	39.00 to 40.00
Stove plate	39.00 to 40.00

DETROIT

Per gross ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$34.25 to $35.25
No. 2 hvy. melting	34.25 to 35.25
No. 1 bundles	34.25 to 35.25
New busheling	34.25 to 35.25
Flashings	34.25 to 35.25
Mach. shop turn.	30.00 to 31.00
Shoveling turn.	31.00 to 32.00
Cast iron borings	31.00 to 32.00
Mixed bor. & turn.	31.00 to 32.00
Low phos. plate	41.00 to 42.00
No. 1 cupola cast	45.00 to 46.00
Hvy. breakable cast.	38.00 to 39.00
Stove plate	37.00 to 38.00
Automotive cast.	45.00 to 46.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	42.00 to 43.00
No. 1 bundles	42.00 to 43.00
No. 2 bundles	42.00 to 43.00
Mach. shop turn.	33.00 to 34.00
Shoveling turn.	33.00 to 34.00
Mixed bor. & turn.	33.00 to 34.00
Clean cast chemical bor.	39.00 to 41.00
No. 1 machinery cast.	52.00 to 54.00
No. 1 mixed yard cast.	49.00 to 50.00
Hvy. breakable cast.	48.00 to 49.00
Clean auto cast.	52.00 to 54.00
Hvy. axle forge turn.	42.00 to 43.00
Low phos. plate	47.00 to 48.00
Low phos. punchings	47.00 to 48.00
Low phos. bundles	46.00 to 47.00
RR. steel wheels	48.00 to 49.00
RR. coil springs	48.00 to 49.00
RR. malleable	58.00 to 60.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages. Where substantial tonnages of open hearth grades come into a consuming district from outside of that district, the upper range of the price quoted here is the representative average delivered price of the bulk of this incoming material; the lower range shows the price being paid for scrap originating within the consuming district.

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $41.00
No. 2 hvy. melting	38.00 to 39.00
Bundled sheets	38.00 to 39.00
Mach. shop turn.	32.00 to 33.00
Locomotive tires, uncut	45.00 to 46.00
Mis. std. sec. rails	48.00 to 49.00
Rerolling rails	55.00 to 56.00
Steel angle bars	45.00 to 46.00
Rails 3 ft. and under	51.00 to 52.00
RR. steel springs	46.00 to 47.00
Steel car axles	46.00 to 47.00
Grate bars	41.00 to 42.00
Brake shoes	42.00 to 43.00
Malleable	63.00 to 64.00
Cast iron car wheels	45.00 to 46.00
No. 1 machinery cast	45.00 to 46.00
Hvy. breakable cast.	39.00 to 40.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	37.00 to 38.00
No. 2 bundles	37.00 to 38.00
No. 1 busheling	37.00 to 38.00
Long turnings	23.00 to 24.00
Shoveling turnings	25.00 to 26.00
Cast iron borings	24.00 to 25.00
Bar crops and plate	38.00 to 38.50
Structural and plate	38.00 to 38.50
No. 1 cupola cast.	46.00 to 47.00
Stove plate	43.00 to 44.00
No. 1 RR. hvy. melt.	36.00 to 37.00
Steel axles	38.00 to 39.00
Scrap rails	37.50 to 38.00
Rerolling rails	48.00 to 49.00
Angles & splice bars	40.00 to 41.00
Rails 3 ft. & under	40.00 to 41.00
Cast iron carwheels	35.00 to 36.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.50 to $43.00
No. 2 hvy. melting	42.50 to 43.00
Mach. shop turn.	36.00 to 36.50
Short shov. turn.	37.00 to 37.50
Cast iron borings	36.00 to 36.50
Low phos	46.00 to 46.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	38.00 to 39.00
No. 2 bundles	38.00 to 39.00
Comp. galv. bundles	36.00 to 37.00
Mach. shop turn.	30.00 to 31.00
Mixed bor. & turn.	30.00 to 31.00
Shoveling turn.	31.00 to 32.00
No. 1 cupola cast.	43.50 to 44.00
Hvy. breakable cast.	43.50 to 44.00
Charging box cast.	43.50 to 44.00
Stove plate	43.50 to 44.00
Clean auto cast.	43.50 to 44.00
Unstrip. motor blks.	40.50 to 41.50
Cl'n chem. cast bor.	33.50 to 34.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	39.00 to 40.00
No. 2 bundles	39.00 to 40.00
No. 1 busheling	39.00 to 40.00
Mach. shop turn.	32.50 to 33.50
Shoveling turn.	34.50 to 35.50
Cast iron borings	31.50 to 32.50
Mixed bor. & turn.	31.50 to 32.50
No. 1 cupola cast.	43.00 to 45.00
Charging box cast.	39.00 to 41.00
Stove plate	42.00 to 43.00
Clean auto cast.	43.00 to 45.00
RR. Malleable	50.00 to 55.00
Small mdl. malleable	39.00 to 41.00
Low phos. plate	43.00 to 44.00
Scrap rails	47.00 to 48.00
Rails 3 ft. & under	50.00 to 52.00
RR. steel wheels	46.00 to 48.00
Cast iron carwheels	46.00 to 48.00
RR. coil & leaf spgs.	46.00 to 48.00
RR. knuckles & coup.	46.00 to 48.00

CLEVELAND

Per gross ton delivered to consumer:*

No. 1 hvy. melting	$39.00 to $42.50
No. 2 hvy. melting	39.00 to 42.50
No. 1 bundles	39.00 to 42.50
No. 2 bundles	39.00 to 42.50
No. 1 busheling	39.00 to 42.50
Drop forge flashings	39.00 to 42.50
Mach. shop turn.	35.50 to 36.00
Shoveling turn.	36.50 to 37.00
Steel axle turn.	39.00 to 42.50
Cast iron borings	36.00 to 36.50
Mixed bor. & turn.	36.00 to 36.50
Low phos.	43.00 to 43.50
No. 1 machinery cast.	50.00 to 52.00
Malleable	60.00 to 62.00
RR. Cast.	50.00 to 52.00
Railroad grate bars	42.00 to 44.00
Stove plate	48.00 to 50.00
RR hvy melting	40.50 to 41.00
Rails 3 ft. & under	53.00 to 54.00
Rails 18 in. & under	55.00 to 56.00

†See box on this page.

SAN FRANCISCO

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	$25.00
No. 2 hvy. melting	25.00
No. 2 bales	25.00

Per gross ton delivered to consumer:

No. 3 bales	$19.50
Mach. shop turn.	16.00
Elec. furn. 1 ft. und	$32.00 to 34.00
No. 1 cupola cast.	32.00 to 33.00
RR. hvy. melting	26.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$25.50
No. 2 hvy. melting	25.50
No. 1 bales	25.50
No. 2 bales	25.50
No. 3 bales	19.50
Mach. shop turn.	17.50
No. 1 cupola cast.	$35.00 to 36.00
RR. hvy. melting	26.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$24.00
Elec. furn. 1 ft. and und.	27.50
No. 1 cupola cast.	27.50
RR. hvy. melting	25.00

HAMILTON, ONT.

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

Heavy melting	$22.00*
No. 1 bundles	22.00*
No. 2 bundles	21.50*
Mechanical bundles	20.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.00*
Bushelings, new fact., prep'd	21.00*
Bushelings, new fact., unprep'd	16.00*
Short steel turnings	17.00*
No. 1 cast.	36.00 to 40.00

*Ceiling Price.

Comparison of Prices . .

Advances over past week in Heavy Type, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Nov. 4, 1947	Oct. 28, 1947	Oct. 7, 1947	Nov. 5, 1946
Hot-rolled sheets	2.80	2.80	2.80	2.425
Cold-rolled sheets	3.55	3.55	3.55	3.275
Galvanized sheets (10 ga.)	3.95	3.95	3.95	4.05*
Hot-rolled strip	2.80	2.80	2.80	2.45
Cold-rolled strip	3.55	3.55	3.55	3.05
Plates	2.95	2.95	2.95	2.50
Plates wrought iron	6.85	6.85	6.85	4.112
Stain's c-r strip (No. 302)	30.50	30.50	30.50	30.30
*24 gage				
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.75	$5.75	$5.75	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. ternes	4.90	4.90	4.90	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.90	2.90	2.90	2.50
Cold-finished bars	3.55	3.55	3.55	3.10
Alloy bars	3.30	3.30	3.30	2.92
Structural shapes	2.80	2.80	2.80	2.35
Stainless bars (No. 302)	26.00	26.00	26.00	25.97
Wrought iron bars	7.15	7.15	7.15	4.76
Wire and Wire Products: (cents per pound)				
Bright wire	3.55	3.55	3.55	3.05
Wire nails	4.25	4.25	4.25	3.75
Rails: (dollars per 100 lb)				
Heavy rails	$2.75	$2.75	$2.75	$43.39*
Light rails	3.10	3.10	3.10	49.18*
*per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$45.00	$45.00	$45.00	$39.00
Sheet bars	66.00	66.00	66.00	38.00
Slabs, rerolling	45.00	45.00	45.00	39.00
Forging Billets	55.00	55.00	55.00	47.00
Alloy blooms, billets, slabs	66.00	66.00	66.00	58.43
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.80	2.80	2.80	2.30
Skelp	2.60	2.60	2.60	2.05

Pig Iron: (per gross ton)	Nov. 4, 1947	Oct. 28, 1947	Oct. 7, 1947	Nov. 5, 1946
No. 2, foundry, Phila.	$41.36	$41.36	$41.22	$30.43
No. 2, Valley furnace	36.50	36.50	36.50	28.50
No. 2, Southern Cin'ti	40.24	40.24	39.75	27.80
No. 2, Birmingham	34.88	34.88	34.88	24.88
No. 2, foundry, Chicago†	36.00	36.00	36.00	28.50
Basic del'd Philadelphia	40.86	40.86	40.72	29.93
Basic, Valley furnace	36.00	36.00	36.00	28.00
Malleable, Chicago†	36.50	36.50	36.50	28.50
Malleable, Valley	36.50	36.50	36.50	28.50
Charcoal, Chicago	50.04	56.04	49.49	42.34
Ferromanganese‡	145.00	145.00	145.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh	$42.50	$42.50	$38.00	$20.00
Heavy melt'g steel, Phila.	42.50	42.50	37.50	18.75
Heavy melt'g steel, Ch'go	*39.50*	42.75	38.75	18.75
No. 1, hy. comp. sheet, Det.	34.75	34.75	34.50	17.32
Low phos. Youngs'n	46.25	46.25	44.50	22.50
No. 1, cast, Pittsburgh	48.50	47.50	43.00	25.00
No. 1, cast, Philadelphia	53.00	53.00	47.50	25.00
No. 1, cast, Chicago	52.50	52.50	49.50	25.00

Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$12.50	$12.50	$12.00	$8.75
Foundry coke, prompt	14.00	14.00	13.75	8.50

Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	21.50	21.50	21.50	14.375
Copper, Lake, Conn.	21.625	21.625	21.625	14.375
Tin, Straits, New York	80.00	80.00	80.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	9.25
Lead, St. Louis	14.80	14.80	14.80	8.10
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67	37.67	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Nov. 4, 1947	3.19141¢ per lb.	$36.96 per gross ton	$41.50 per gross ton
One week ago	3.19141¢ per lb.	$36.96 per gross ton	$42.58 per gross ton
One month ago	3.19141¢ per lb.	$36.93 per gross ton	$38.08 per gross ton
One year ago	2.73011¢ per lb.	$28.13 per gross ton	$19.17 per gross ton

	HIGH	LOW
1947	3.19141¢ Aug. 5	2.87118¢ Jan. 7
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5
1943	2.29176¢	2.29176¢
1942	2.28249¢	2.28249¢
1941	2.43078¢	2.43078¢
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16
1939	2.35367¢ Jan. 3	2.26689¢ May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2
1933	1.95578¢ Oct. 3	1.75836¢ May 2
1932	1.89196¢ July 5	1.83901¢ Mar. 1
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

HIGH	LOW
$37.35 Aug. 19	$30.14 Jan. 7
30.14 Dec. 10	25.37 Jan. 1
25.37 Oct. 23	23.61 Jan. 2
$23.61	$23.61
23.61	23.61
23.61	23.61
$23.61 Mar. 20	$23.45 Jan. 2
23.45 Dec. 23	22.61 Jan. 2
22.61 Sept. 19	20.61 Sept. 12
23.25 June 21	19.61 July 6
23.25 Mar. 9	20.25 Feb. 16
19.74 Nov. 24	18.73 Aug. 11
18.84 Nov. 5	17.83 May 14
17.90 May 1	16.90 Jan. 27
16.90 Dec. 5	13.56 Jan. 3
14.81 Jan. 5	13.56 Dec. 6
15.90 Jan. 6	14.79 Dec. 15
18.21 Jan. 7	15.90 Dec. 16
18.71 May 14	18.21 Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

HIGH	LOW
$42.58 Oct. 28	$29.50 May 20
31.17 Dec. 24	19.17 Jan. 1
19.17 Jan. 2	18.92 May 22
19.17 Jan. 11	15.76 Oct. 24
$19.17	$19.17
19.17	19.17
$22.00 Jan. 7	$19.17 Apr. 10
21.83 Dec. 30	16.04 Apr. 9
22.50 Oct. 3	14.08 May 16
15.00 Nov. 22	11.00 June 7
21.92 Mar. 30	12.67 June 9
17.75 Dec. 21	12.67 June 8
13.42 Dec. 10	10.33 Apr. 29
13.00 Mar. 13	9.50 Sept. 25
12.25 Aug. 8	6.75 Jan. 3
8.50 Jan. 12	6.43 July 5
11.33 Jan. 6	8.50 Dec. 29
15.00 Feb. 18	11.25 Dec. 9
17.58 Jan. 29	14.08 Dec. 8

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25c above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 20,000 lb to 89,999 lb. (9) Carload lot in manufacturing trade. (10) Delivered Los Angeles only. (11) Boxed. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only: Includes 3 pct freight tax. (14) Delivered Kaiser Co. prices: includes 3 pct freight tax. (15) to 0.035 to 0.075 in. thick by $\frac{3}{4}$ to $3\frac{1}{2}$ in. wide. (16) Spot market as high as $92 gross ton. (17) Delivered Los Angeles: add ½c per 100 lb for San Francisco. (18) Slab prices subject to negotiation in most cases. Some producers charge (19) $2 more, (21) $1 more. Some producers charge (22) 0.05¢ less, (23) 0.10¢ less, (24) 0.20¢ less.

Basing Points	Pitts-burgh	Chicago	Gary	Cleve-land	Birm-ingham	Buffalo	Youngs-town	Spar-rows Point	Granite City	Middle-town, Ohio		San Franc'co. Los Angeles, Seattle	DELIVERED TO Detroit	New York	Phila-delphia
INGOTS Carbon, rerolling	($38.00 f. o. b. mill) (Spot market as high as $80 gross ton)														
Carbon, forging	$46.00														
Alloy	$56.00									(Canton = $56.00)					
BILLETS, BLOOMS, SLABS Carbon, rerolling [18]	$45.00[19]	$45.00[19]	$45.00[19]	$47.00	$45.00[19]	$45.00[19]							$48.00[19]		
Carbon, forging billets	$55.00	$55.00	$55.00	$55.00	$55.00	$55.00							$58.00		
Alloy	$66.00	$66.00				$66.00	(Bethlehem, Massillon, Canton = $66.00)						$69.00		
SHEET BARS[16]							$66.00								
PIPE SKELP	2.60¢[21]	2.65¢					2.60¢[21]	2.60¢[21]							
WIRE RODS	2.80¢[21]	2.80¢[21]		2.80¢[21]	2.85¢		(Worcester = 2.90¢[21])					3.52¢[13]			
SHEETS Hot-rolled	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	3.175¢	(Ashland, Ky. = 2.80¢)		3.54[17]¢	2.95¢	3.12¢	3.02¢
Cold-rolled[1]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢	3.55¢		3.65¢	3.55¢			3.70¢	3.96¢	3.97¢
Galvanized (10 gage)	3.95¢[23]	3.95¢[23]	3.95¢[23]		3.95¢[23]		3.95¢	3.95¢	4.05¢	3.95¢	(Ashland = 3.95¢)	4.62¢[17]		4.27¢	4.17¢
Enameling (12 gage)	3.95¢[22]	3.95¢[22]	3.95¢[22]	3.95¢			3.95¢		4.05¢	3.95¢			4.10¢[22]	4.42¢	4.37¢
Long ternes [2] (10 gage)	4.05¢[24]	4.05¢[24]	3.85¢											4.52¢	4.47¢
STRIP Hot-rolled [3]	2.80¢	2.80¢	2.80¢	2.80¢[15]	2.80¢		2.80¢					3.60¢[17]	2.95¢	3.27¢	3.22¢
Cold-rolled [4]	3.55¢	3.65¢		3.55¢			3.55¢			(Worcester = 3.75¢)			3.70¢	4.02¢	3.97¢
Cooperage stock	3.10¢	3.10¢			3.10¢		3.10¢							3.57¢	
TINPLATE Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85	(Warren, Ohio = $5.75)				$6.217	$6.092[11]
Electro, box 0.25 lb.	Deduct 90¢ from standard coke base box price.														
Electro, box 0.50 lb.	Deduct 70¢ from standard coke base box price.														
Electro, box 0.75 lb.	Deduct 50¢ from standard coke base box price.														
BLACKPLATE, 29 gage[5]	3.90¢	3.90¢	3.90¢		4.00¢			4.00¢	4.00¢					4.32¢	4.22¢
BLACKPLATE, CANMAKING 55 lb. to 70 lb.	Deduct $1.55 from standard coke base box.														
75 lb. to 95 lb.	Deduct $1.65 from standard coke base box.														
100 lb. to 118 lb.	Deduct $1.55 from standard coke base box.														
TERNES, MFG., Special coated	Deduct 85¢ from standard coke base box price.														
BARS Carbon steel	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢					3.625¢[17]	3.05¢	3.314	3.32¢
Rail steel[6]	Subject to negotiation because of fluctuating scrap prices.														
Reinforcing (billet)[7]	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢				3.325¢[17]		3.07¢	2.97¢
Reinforcing (rail)	Subject to negotiation because of fluctuating scrap prices.														
Cold-finished[8]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢							3.70¢	3.96¢	3.97¢
Alloy, hot-rolled	3.30¢	3.30¢				3.30¢	3.30¢	(Bethlehem, Massillon, Canton = 3.30¢)					3.45¢		3.45¢
Alloy, cold-drawn	4.10¢	4.10¢	4.10¢	4.10¢		4.10¢							4.25¢		
PLATE Carbon steel[12]	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢		2.95¢	(Coatesville = 3.15¢, Claymont = 3.15¢, Geneva, Utah = 3.10¢) 2.95¢				3.76¢[14]		3.27¢	3.17¢
Floor plates	4.20¢	4.20¢												4.67¢	4.62¢
Alloy	3.80¢	3.80¢			(Coatesville = 4.50¢)									4.27¢	4.02¢
SHAPES, Structural	2.80¢	2.80¢	2.80¢		2.80¢	2.80¢	(Geneva, Utah = 3.95¢, Bethlehem = 2.80¢)					3.43¢[10]		3.02¢	2.95¢
SPRING STEEL, C-R 0.08 to 0.40 carbon	3.55¢			3.55¢			(Worcester = 3.75¢)								
0.41 to 0.60 carbon	5.05¢			5.05¢			(Worcester = 5.25¢)								
0.61 to 0.80 carbon	5.65¢			5.65¢			(Worcester = 5.85¢)								
0.81 to 1.05 carbon	7.15¢			7.15¢			(Worcester = 7.35¢)								
1.06 to 1.35 carbon	9.45¢			9.45¢			(Worcester = 9.65¢)								
MANUFACTURERS' WIRE[9] Bright	3.55¢	3.55¢		3.55¢	3.55¢		(Worcester = 3.65¢, Duluth = 3.60¢)					4.56¢[13]		3.99¢	3.97¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.60¢	4.60¢		4.60¢	(Worcester = 4.70¢, Duluth = 4.85¢) (Trenton = 4.85¢)							5.28¢[13]		5.04¢	4.96¢
PILING, Steel sheet	3.30¢	3.30¢				3.30¢								3.71¢	3.72¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi Canton, Phila, Reading, Ft. Wayne, Balt	Subject to negotiation			Subject to negotiation		
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation			Subject to negotiation		
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton Youngstown	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton (4 to 8 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo	Co	Base Per lb
18	4	1	—	—	..... 82¢
18	4	1	—	5	.... $1.29
18	4	2	—	—	..... 93¢
1.5	4	1.5	8	—	.... 59¢
6	4	2	6	—	..... 63¢

High-carbon-chromium*	47¢
Oil hardening manganese*	26¢
Special carbon*	24¢
Extra carbon*	20¢
Regular carbon*	17¢

Warehouse prices on and east of Mississippi are 2¢ per lb. higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.50¢
Armature	4.80¢
Electrical	5.30¢
Motor	6.05¢
Dynamo	6.75¢
Transformer 72	7.25¢
Transformer 65	7.95¢
Transformer 58	8.65¢
Transformer 52	9.45¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.75
Angle splice bars, 100 lb	3.25
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$3.10
Light rails (from rail steel), f.o.b. Williamsport, Pa.	3.45

	Base per lb
Cut spikes	4.85¢
Screw spikes	6.90¢
Tie plate, steel	3.05¢
Tie plates, Pittsburg, Calif.	3.20¢
Track bolts	7.00¢
Track bolts, heat treated, to railroads	7.25¢

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio; Weirton, W. Va.; St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa.; Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$7.05	$14.10

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	*24.00	*22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad		
10 pct, f.o.b. Coatesville	30.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg	Delivered San Francisco
Standard & coated nails	$4.25†	$5.33
Galvanized nails‡‡	4.00†	5.08
Cut nails, carloads, Pittsburgh base	5.80*	....

† 10¢ additional at Cleveland, 35¢ at Worcester. ‡‡ Plus $2.75 per 100 lb galvanizing extra. *Less 20¢ to jobbers.

	Base per 100 lb	
Annealed fence wire	$4.20‡	$5.31
Annealed galv. fence wire	4.65‡	5.66

‡ 10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base column	
Woven wire fence*	91	114
Fence posts, carloads	90††	...
Single loop bale ties	91	116
Galvanized barbed wire**	101	121
Twisted barbless wire	101	...

* 15½ gage and heavier. ** On 80-rod spools in carload quantities. ††Pittsburgh, Duluth.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	HI Steel	Mayari R	Otiscoloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Sheets									
Hot-rolled	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Cold-rolled	5.30	5.30	5.30	....	5.30	5.30	5.30	5.30	5.30
Galvanized	....	5.85	....	....	....	6.00	....	....	....
Strip									
Hot-rolled	4.30	4.30	4.30	....	4.30	4.30	4.30	4.30	4.30
Cold-rolled	....	....	5.30	....	....	5.30	5.30	5.30	5.30†
Shapes	....	4.30	....	....	4.30	4.30	4.30	4.30	....
Beams	....	4.30	....	....	....	4.30	....	....	....
Bars									
Hot-rolled	4.45	4.45	4.45	....	....	4.45	4.45	4.45	4.45
Cold-rolled	....	....	....	....	....	....	....	....	....
Bar shapes	....	4.45	....	....	4.45	4.45	4.45	4.45	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts. f.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only
Base price, $280.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
⅛-in.	50½	34½
¼-in.	53½	38½
1-in.	56	41½
1¼-in.	56½	42
1½-in.	57	42½
2 in.	57½	43
2½ and 3-in.	58	43½
Wrought Iron, buttweld		
⅛-in.	+ 7	+29
¼-in.	2½	+19
1 and 1¼-in.	8	+11
1½-in.	13½	+ 7½
2-in.	14	+ 7
Steel, lapweld		
2-in.	49	34
2½ and 3-in.	52	37
3½ to 6-in.	54	39
Steel, seamless		
2-in.	48	33
2½ and 3-in.	51	36
3½ to 6-in.	53	38
Wrought Iron, lapweld		
2-in.	5½	+14½
2½ to 3½-in.	8	+10½
4-in.	12	+ 5
4½ to 8-in.	10	+ 6½

Extra Strong, plain ends

Steel, buttweld		
⅛-in.	49½	35
¼-in.	53½	39
1-in.	55½	42
1¼-in.	56	42½
1½-in.	56½	43
2-in.	57	43½
2½ and 3-in.	57½	44
Wrought Iron, buttweld		
⅛-in.	+ 2½	+23
¼-in.	3½	+17
1 to 2-in.	13	+ 7
Steel, lapweld		
2-in.	48	34
2½ and 3-in.	52	38
3½ to 6-in.	55½	41½
Steel, seamless		
2-in.	47	33
2½ and 3-in.	51	37
3½ to 6-in.	54½	40½
Wrought Iron, lapweld		
2-in.	8½	+11
2½ to 4-in.	17½	+ ½
4½ to 6-in.	13	+ 5

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

OD	Gage	Seamless		Electric Weld	
in.	BWG	Hot-Rolled	Cold-Drawn	Hot-Rolled	Cold-Drawn
2	13	$16.67	$19.99	$16.17	$19.39
2½	12	22.42	26.87	21.75	26.06
3	12	24.93	29.90	24.18	29.00
3½	11	31.17	37.39	30.23	36.27
4	10	38.69	46.38	37.53	44.99

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in. del'd Chicago	$86.12
6-in. to 24-in. del'd New York	84.18
6-in. to 24-in., Birmingham	74.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	100.90

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Percent Off List
½ in. & smaller x 6 in. & shorter	45
9/16 & ⅝ in. x 6 in. & shorter	46
¾ in. & larger x 6 in. & shorter	43
All diam, longer than 6 in.	41
Lag, all diam over 6 in. long	44
Lag, all diam x 6 in. & shorter	46
Plow bolts	54

Nuts, Cold Punched or Hot Pressed (Hexagon or Square)

½ in. and smaller	43
9/16 to 1 in. inclusive	42
1⅛ to 1½ in. inclusive	40
1⅝ in. and larger	35

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	USS	SAE
7/16 in. and smaller		46
½ in. and smaller	44	..
½ in. through 1 in.		44
9/16 in. through 1 in.	43	..
1⅛ in. through 1½ in.	41	42
1⅝ in and larger	35	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Packages, nuts separate	65 and 10
In bulk	75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets (½ in. and larger)

Base per 100 lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$5.65
F.o.b. Lebanon, Pa.	5.80

Small Rivets (7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55

Cap and Set Screws

(In packages)	*Percent Off List*
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	53
¾ to 1 in. x 6 in., SAE 1035, heat treated	44
Set screws, cup and oval points	57
Milled studs	43
Flat head cap screws, listed sizes	16
Fillister head cap, listed sizes	37

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$5.95
Old range, nonbessemer	5.80
Mesabi, bessemer	5.70
Mesabi, nonbessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	24¢ to 28½¢
Copper, electrolytic, 100 and 325 mesh	30¢ to 31½¢
Copper, reduced, 150 and 200 mesh	29¢ to 30½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots	10¢ to 17¢
Swedish sponge iron, 100 mesh, c.l.f. N. Y., carlots, ocean bags	7.4¢ to 8.5¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	35¢ to 37¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	29¢ to 33¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	23¢ to 26¢
Antimony, 100 mesh	36.05¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.035
Lead, 100, 200, & 300 mesh	18.50¢ to 23.50¢
Manganese, minus 325 mesh and coarser	49¢
Nickel, 100 mesh	51½¢
Silicon, 100 mesh	26¢
Solder powder, 100 mesh	8½¢ plus metal
Stainless steel, 302, minus 100 mesh	75¢
Tin, 100 mesh	90¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$3.05
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.	$2.65
Under 100 lb	$2.90

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$12.00 to $13.00
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	13.50 to 14.50
Foundry, Byproduct	
Chicago, del'd	$17.10
Chicago, f.o.b.	16.10
New England, del'd	19.75
Seaboard, Kearney, N. J., f.o.b.	17.85
Philadelphia, f.o.b.	16.75
Swedeland, Pa., f.o.b.	16.75
Buffalo, del'd	18.75
Ashland, Ohio, f.o.b.	15.50
Painesville, Ohio, f.o.b.	16.60
Erie, del'd	16.75
Cleveland, del'd	17.90
Cincinnati, del'd	15.39
St. Louis, del'd	18.03
Birmingham, del'd	15.00

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads, Per 1000
No. 1, Ohio	$64.00
First quality, Pa., Md., Ky., Mo., Ohio	70.00
First quality, New Jersey	75.00
Sec. quality, Pa., Md., Ky., Mo, Ohio	64.00
Sec. quality, New Jersey	59.00
No. 2, Ohio	56.00
Ground fire clay, net ton, bulk	10.00

Silica Brick

Pennsylvania and Birmingham	$70.00
Chicago District and Alabama	79.00
Silica cement, net ton (Eastern)	12.00
East Chicago	13.00

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$59.00

Magnesite Brick

Standard, Balt. and Chester	$81.00
Chemically bonded, Baltimore	70.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in bulk	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	24.00
in sacks	28.00

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest: add 10¢; Missouri Valley; add 20¢	$11.05

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.44	$5.18	$5.69	$4 73	$5 28	$4.79	$4.52	$4.78	$5.48	$8.32	$8.42	$9 83	$9.93
New York	4.71	5.72[1]	6.11	5.03	5.95	5.06	4.75	5.02	5 57	8 40	8 50	9 92	10.05
Boston	4 70	5.57[12]	5.50[12]	4 70	6.71	5 05	4 77	4 92	5 57	8.62	8.72	9.98	10.08
Baltimore	4 31	....	5.54	4.76	....	4.76	4.68	4.81	5 61	....	....	....	....
Norfolk	4.75	....	....	5 15	....	5.00	5.00	5 05	5.85	....	....	....	....
Chicago	4.25	5.10	5.65	4.35	5.45	4.60	4.40	4 40	5.10	8.05	8.15	9.30	9.40
Milwaukee	4.399	5.249[1]	5.799	4.499	5.899	4.749	4.549	4.549	5.249	8.349	8.449	9.599	9 699
Cleveland	3.95	4.55	5.238	4.188	5.00	4.25†	4.311	4.10	4.95	8.308	8.408	9.30	9.40
Buffalo	4.25	5.10	5.95	4.65	5.61[5]	4.90	4.40	4.40	5.10	8.05	8.15	9.30	9.40
Detroit	4.35	5.20	5.97	4.64	5.59	4.84†	4.72	4.50	5.22	8.46	8.56	9.69	9.79
Cincinnati	4.471	5.166	5.166	4 694	....	4.903	4.744	4.703	5.403	....	....	....	....
St. Louis	4.549	5.399[1]	5 974	4.649	5.774	4.899	4.699	4.699	5.424	8.524	8.624	9.774	9.874
Pittsburgh	4.25	5.10[1]	5 65	4.35	4.95	4.60	4.40	4 40	4.95	8.05	8.15	9.30	9.40
St. Paul	4.884[7]	5.434[1]	5 834[2]	4 884[7]	....	4 884[7]	4.734[7]	4.734[7]	4 826[6]	....	....	....	....
Omaha	5 165	....	6.565	5 265	....	5 515	5.315	5.315	6 015	....	....	....	....
Indianapolis	4.51	5.29	5.84	4 61	5.46	4.86	4.66	4 65	5.36	....	....	....	....
Birmingham	4.45[11]	....	5.55	4.45[11]	....	4.65[11]	4.40[11]	4.40[11]	5.93	....	....	....	....
Memphis	4 77[11]	5.79[11]	6.32	4 97[11]	....	5.12[11]	4.92[11]	4.92[11]	5.79	....	....	....	....
New Orleans	*4 98[11]	6.29[1]		5 18[11]	....	5.33[11]	*5.03[11]	*5 13[11]	6 29[6]	....	....	....	....
Houston	5 30	....	6.60	5.25	....	5 35	5.15	5 30	6.60	8.75[16]	8.55[16]	9.70[16]	9.80[16]
Los Angeles	5 65	7.35[1]	7 30	5.95	8.70[5]	5 40	5.25	5 40	7.25[14]	9.90[18]	9.60[18]	11.35[18]	11.35[1]
San Francisco	5 20[8]	6.65	6 85	5 50[8]	....	5.30	5.20	5.05	7.35[10]	....	....	....	....
Seattle	5 30[4]	7.10[1]	6.70	5 60[4]	....	5 45[4]	5.25[4]	5.45[4]	7.45[14]	....	9.75[6]	....	11.10[6]
Portland	5.30[4]	....	6 70	5.60[4]	....	5.45[4]	5.25[4]	5 55[4]	7 45[14]	....	....	....	....
Salt Lake City	6.25	....	7.50	6.75	....	6.10	6.25	6.35	7.40	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 to 1999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 450 to 1499 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over.

* Add 46¢ for sizes not rolled in Birmingham.

† Up to ¾ in. thick and 90 in. wide.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	37 00	37.50	38.00	38.50	.....
Birdsboro	40 00	40.50	41.00	41.50	45.00
Birmingham	32 88	33 38	.....	.....	.....
	35 88	36 38			
Buffalo	36 00	36 00	36 50	.....	.....
	37.50*	38.00*	38.50*		
Chicago	35 50	36 00	36 50	37.00	.....
Cleveland	35 50	36 00	36 50	.....	.....
	40.75*	41.75*	41.75*		
Duluth	36 00	36 50	37 00	37.50	.....
Erie	35.50	36 00	36.50	37.00	.....
Everett		45 00	45.50	.....	.....
Granite City	36 50	37.00	37.00	.....	.....
Neville Island	36 00	36 50	36.50	37.00	.....
Provo	37 00	37.50	.....	.....	.....
Sharpsville	36 00	36.50	36.50	37.00	.....
Steelton	37 00	.....	.....	.....	42.00
Struthers, Ohio	36 50	.....	.....	.....	.....
Swedeland	41 00	41.50	42.00	42.50	.....
Toledo	35 50	36.00	36 50	37 00	.....
Troy, N. Y.	37.00	37.50	38.00	38 50	42.00
Youngstown	36.00	36.50	36.50	37.00	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	.....	45.50	46.00	.....	.....
Boston	Steelton	5 30	.....	.....	.....	.....	47.30
Brooklyn	Bethlehem	3 30	40 30	40 80	41 30	41 80	.....
Brooklyn	Birdsboro	3 85	43.85	44.35	44 85	45.35	48.85
Cincinnati	Birmingham	5 39	38 24	38 74	.....	.....	.....
			41 25	41 74			
Jersey City	Bethlehem	2 02	39 02	39 52	40.02	40.52	.....
Jersey City	Birdsboro	2 56	.....	.....	.....	.....	47.56
Los Angeles	Provo	6 53	43 53	44 03	.....	.....	.....
Mansfield	Cleveland-Toledo	2.56	38 06	38 56	39 06	39.56	.....
			43 31*	43 81*	44 31*		
Philadelphia	Bethlehem	1 84	38 84	39 34	39 84	40.34	.....
Philadelphia	Swedeland	1.11	42 11	42 61	43.11	43.61	.....
Philadelphia	Birdsboro	1 64	41 64	42.14	42.64	43.16	46 64
Philadelphia	Steelton	2 38	39 38	.....	.....	.....	44.38
San Francisco	Provo	6 53	43 53	44 03	.....	.....	.....
Seattle	Provo	6 53	43 53	44 03	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	37.25	37.75	37.75	.....	.....

* Republic Steel Corp. price. Basis: Average price of No. 1 hvy. mlt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$45.50; f.o.b. Buffalo — $46.75. Add $1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorous $50.00 per gross ton, f.o.b. Lyles, Tenn. Delivered Chicago, $56.04. High phosphorous charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood Tenn.

Carload lots (bulk)	$145
Less ton lots (packed)	172.00
Delivered Pittsburgh	151.00

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	8.00	8.25	8.80
Ton lots	9.00	9.60	11.50
Less ton lots	9.40	10.00	11.90

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$46.00	$47.00
F.o.b Pittsburgh	50.00	51.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn. 0.2% max. C, 1% max. Si, 2% max Fe.

Carload, bulk	32
L.c.l. lots	34

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.06% max. C, 0.06% P, 90% Mn	23.00	24.10	24.70
0.10% max C	22.50	23.60	24.20
0.15% max. C	22.00	23.10	23.70
0.30% max C	21.50	22.60	23.20
0.50% max. C	21.60	22.10	22.70
0.75% max. C, 7.00% max. Si	18.00	19.10	19.70

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max C

Carload, bulk	7.40
Ton lots	8.45
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	7.65
Ton lots	8.65
Less ton lots	9.05

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $73.00 f.o.b. Keokuk, Iowa; $73.75 f.o.b. Niagara Falls; $70.75, f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add 50¢ per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	18.50	19.85	21.60
97% Si, 1% Fe	18.00	20.25	22.00

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	4.80	5.05	5.25
Ton lots	5.80	6.40	6.70
Less ton lots	6.20	6.80	7.10

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	15.00	15.65	15.90
50% Si	8.80	9.30	9.50
75% Si	11.20	11.50	12.25
80-90% Si	12.70	13.00	13.75
90-95% Si	14.35	14.65	15.35

Ferrochrome (65-72% *Cr, 2% max. Si*)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	25.00	25.40	26.00
0.10% C	24.50	24.90	25.50
0.15% C	24.00	24.40	25.00
0.20% C	23.75	24.15	24.25
0.50% C	23.50	23.90	24.00
1.00% C	23.00	23.40	23.50
2.00% C	22.50	22.90	23.00
65-69% Cr, 4.9% C	17.60	18.00	18.15
62-66% Cr. 4-6% C. 6-9% Si.	18.60	19.00	19.15

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	11.10	11.35	11.45
Ton lots	12.00	12.90	13.50
Less ton lots	12.40	13.30	13.90

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chrominum contained, lump sie, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	18.70	19.10	19.25
Ton lots	19.90	21.20	22.00
Less ton lots	20.60	21.90	22.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	23.00	23.40	23.50
Ton lots	24.35	25.00	26.20
Less ton lots	25.35	26.00	27.20

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	91.00	92.50	93.75
0.50% max. C	87.00	88.50	89.75
9.00% min. C	87.50	89.00	91.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	17.60	18.35	20.50
Less ton lots	18.60	19.35	21.50

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	16.75	17.25	19.30
Ton lots	18.85	19.70	21.45
Less ton lots	19.85	20.70	22.45

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.85	$2.70 $3.40
Less ton lots	2.20	3.05 4.20

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr. 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	17.25	18.35	20.30
Less ton lots	18.00	19.10	21.05

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	15.05	16.15	18.10
Less ton lots	15.80	16.90	18.85

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa. York, Pa., per pound contained W, 5 ton lots, freight allowed	$2.50
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)	3.10
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2A_5	$1.30
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb	
Ton lots	$2.50
Less ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b Langeloth, Washington, Pa., per pound contained Mo.	95¢
Calcium molybdate, 40-45%, f.o.b Langeloth, Washington, Pa., Per pound contained Mo.	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo.	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo.	80¢
Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y. ton lots, per pound contained Ti	$1.33
Less ton lots	$1.38
Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$142.50
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Sigio) Tenn., $3 unitage per gross ton	$65.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	18.40¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	6.00¢
Alsifer, 20% Al, 40% Si, 40% Ft, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	6.50¢
Ton lots	7.00¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	9.00¢
Ton lots	9.75¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese — Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.044

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$1.80	$1.8125	$1.8445

Silicaz, contract basis, f.o.b. plant freight allowed, per pound.

Carload lots	37.00¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	87.5¢
No. 6	60¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15—17%, B 0.90—1.15%, Si 2.5—3.0% Al 1.0—2.0%.

Ton lots, per pound	8.0¢